

Recommencement of uranium mining in Queensland

A best practice framework

Report of the
Uranium Mining Implementation Committee
Councillor Paul Bell AM Chairman

March 2013

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Published by the Queensland Government, March 2013, 100 George Street, Brisbane Qld, 4000.

ISBN **978-1-921960-02-4**

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Chairman's foreword

In October 2012, Premier Campbell Newman announced that the Queensland Government would support the recommencement of uranium mining in Queensland and established the Uranium Mining Implementation Committee (the Committee) to oversee this process.

The journey for the Committee was manifested out of the Australian Government's expansion of the export opportunities for uranium oxide. Prime Minister of Australia, the Honourable Julia Gillard MP, has said she supports the development of the Australian uranium mining industry, subject to world's best practice environmental conditions and safety standards. The Honourable Martin Ferguson (AM) MP, Minister for Resources and Energy, also encouraged the Queensland Government to reintroduce uranium mining in Queensland, setting the scene for a thoughtful but swift response from the Queensland Government.

This decision of the Queensland Government opens the way for significant economic activity while bringing the state into line with national policy. The mining and extraction of uranium is now permitted in all states and territories except Victoria and New South Wales.

Australia has over 30 per cent of the world's known uranium reserves, exporting approximately 7000 tonnes last financial year, worth over AUD\$600 million. Estimates provided to the Committee indicate the current value of Queensland's major uranium deposits to be approximately AUD\$10 billion. The recommencement of uranium mining will therefore contribute to the Queensland Government's commitment to establish a four pillar economy, strengthen the resource industry and provide jobs, royalties and crucial regional development opportunities while promoting the state's attractiveness for exploration.

The Committee has been asked to report to the Queensland Government recommending a best practice policy framework for the orderly development and operation of a recommenced uranium mining and export industry in Queensland. As required by the Committee's terms of reference, this report recommends a best practice policy and regulatory framework which we believe will ensure that uranium mining recommences with world best practice environmental and safety standards, whilst creating an attractive environment for investment.

The Committee recognises that there are wide ranging views and perceptions regarding uranium mining and its uses. Most of these stem from concerns about health and environmental issues, and the need to harness regional opportunities.

From the outset it was essential that the Committee understood the requirements of a contemporary uranium mining industry, the environmental and safety issues that are different from current mining practices and the logistical issues required to transport uranium product both within Australia and to its international markets in a secure and safe manner. These matters were closely investigated by the Committee through focussed and targeted stakeholder engagement. More than 70 submissions were sought locally, nationally and internationally while visits were made to the Northern Territory, South Australia, and Western Australia to engage with government, industry, transport and port authorities.

We are confident that the recommendations within this report not only represent best practice, but are responsive to the needs of the Queensland regions where uranium mining will most likely take place, such as Mt Isa. The experience from our consultations in the Mt Isa region cemented our confidence due in large part to the consistency of information and views presented to the Committee. Many of the recommendations of submitters and lessons learned from interstate visits harmonised with that learned at the local, national and international level from information and views presented by mining operators, uranium mining proponents, Traditional Owners, local government representatives and community organisations.

I trust this report will be a useful guide to the Queensland Government in the recommencement of uranium mining and will help to ensure that local communities gain the maximum benefit from uranium mining activities. I commend this report to the Queensland Government for its review.



Cr Paul Bell AM Chairman
Uranium Mining Implementation Committee membership

Appointed members

The Committee is chaired by Councillor Paul Bell AM of the Central Highlands Regional Council. Other members of the Committee are:

- Noeline Ikin, CEO Northern Gulf Resource Management Group
- Frances Hayter, Environment Director, Queensland Resources Council (QRC)
- Dr Geoff Garrett AO, Queensland Government Chief Scientist
- Warren Mundine, Director of the Australian Uranium Association and a former Australian Labor Party (ALP) National President.
- Dan Hunt, Director-General, Department of Natural Resources and Mines (DNRM), Queensland.

Acknowledgements

While the Committee retains ultimate responsibility for the final report, the Committee acknowledges the contributions and specialist advice obtained from the following key readers:

Key readers

Dr Arthur Johnston
Former Supervising Scientist, Commonwealth Government

George Dracoulis
Professor Emeritus
Department of Nuclear Physics, Australian National University

Secretariat

The Committee would like to express its gratitude for the efforts, hard work and knowledge offered by members of the secretariat team. Contributions from these officers have enabled the Committee to deliver a comprehensive and high quality product in a short period of time.

Report at a glance

In October 2012, the Queensland Government announced support for the recommencement of uranium mining in Queensland, reversing a long-held ‘policy ban’. The Uranium Mining Implementation Committee (the Committee) was established to recommend a best practice policy framework for the orderly development and operation of this industry in Queensland. The Terms of Reference for the Committee are included in Appendix A.

To inform its report, the Committee undertook a focused program of stakeholder engagement over a four month period. More than 70 submissions were sought locally, nationally and internationally. The Committee made visits to the Northern Territory, South Australia, and Western Australia, in addition to the Mt Isa and Townsville regions, engaging government, industry, uranium mining operators, transport and port authorities, Traditional Owners, and community organisations.

The Committee has concluded that, with certain adaptations, Queensland’s existing system for regulating mining and radiation safety is appropriate for uranium mining and therefore a new legislative framework is not needed to regulate a Queensland uranium mining industry. A comprehensive regulatory system for the uranium industry is also in place at the federal government level.

The Committee makes recommendations on how the existing framework can be adapted to ensure the recommencement of uranium mining is undertaken within a best practice framework. The central recommendations relate to new institutional arrangements to improve coordination of assessment and approvals for uranium mines; ensure optimal cooperation between regulatory agencies; improve engagement with stakeholders; and an initiative to assist Indigenous people to access the benefits from uranium mining and the resources industry.

The key recommendations and actions include:

- The Queensland Government should ensure a coordinated approvals process for uranium mining by referring all proposals to the Coordinator-General’s ‘coordinated project’ process (this policy should be reviewed after an initial period).
- Assessment of uranium mines for the purposes of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) should be undertaken according to the bilateral agreement between the Queensland and Australian Governments.
- A whole-of-government Uranium Mining Oversight Committee (UMOC) should be established to oversee uranium mining implementation, operation and rehabilitation.
- An independent ‘specialist advisor’ with expertise in managing environmental performance of uranium mining such as the Australian Government’s Supervising Scientist Division (SSD), should conduct compliance and performance audits.
- A Uranium Mining Stakeholder Committee (UMSC) should be established that is supported by the UMOC, representing local governments and communities, Indigenous communities, industry, environment and natural resource management groups.

- The Queensland Government should establish an inter-state committee to oversee and harmonise transport and logistics associated with uranium, including mutual recognition of transport licences.
- The Queensland Government should facilitate the use of existing ports (Darwin and Adelaide) and shipping lanes for uranium export.
- A Memorandum of Understanding (MOU) should be developed between Queensland’s transport regulators regarding transport compliance inspections.
- A new MOU should be established between relevant regulatory agencies to ensure clear roles and responsibilities with regard to the oversight and administration of the uranium industry in Queensland, and to foster cooperation and sharing of expertise.
- Specific mine safety and health guidance documentation must be developed to ensure best standards are maintained at all stages of uranium exploration, mining, and ore milling and processing.
- Radiation safety regulators must develop and implement guiding principles for emergency response, and conduct education and training for emergency workers.
- Environmental model conditions specific to uranium mining must be developed. These conditions must focus on achieving positive environmental outcomes rather than prescriptive measures.
- Rehabilitation guidance material must be reviewed with particular consideration to the need for rehabilitation goals, objectives and completion criteria specific to uranium mining.
- Third party auditors should be used to augment the Queensland Government’s in-house expertise in the regulation of uranium mining activities.
- The Royalties for Regions (R4R) program should be expanded to future uranium mining areas.
- The Queensland Government should implement a training and business development initiative in the form of a trust arrangement with a government funding contribution to assist Indigenous Queenslanders access benefits from uranium mining.
- The Queensland Government should apply a 5 per cent royalty regime to uranium, but also investigate use of a higher rate once the price of uranium reaches a certain higher threshold. It should also offer a ‘new mine’ concessional royalty rate of 2.5 per cent for the first five years of a mine’s life.
- As part of the Queensland Government’s investigations of the development of ‘rare earths’ at Mary Kathleen, the government should consider the potential for uranium to be produced as a co-product, for example uranium present in tailings along with other minerals, and the potential for conditions to further rehabilitate the Mary Kathleen site.

Immediate implementation of these recommendations should be devolved to the Department of Natural Resources and Mines (DNRM), and the first action should be to establish the UMOC.

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1. Committee's summary

1.1 Overall findings

The Committee found that the Queensland Government's decision to allow the recommencement of uranium mining in Queensland effectively brings state policy into line with long established, bipartisan national policies.

Uranium was last mined in Queensland in 1982. Since that time the industry has continued in South Australia and the Northern Territory and the performance of uranium mining has improved markedly in terms of the environment, safety and community engagement. The Committee found that Australia's modern uranium mining industry performs to standards that are equal to, or better than, the broader mining industry.

The Committee found that many of the environmental and radiation safety issues in uranium mining also occur in other existing mining activities. Thus uranium mining is similar to other metalliferous mining operations in terms of the environmental issues that must be addressed. For example, the key environmental issues for uranium mining in Queensland will be the management of tailings, water quality and quantity (both shortfall and excess) and planning for mine closure and remediation. These are key issues in many other mining operations in Queensland and the mining industry has significant experience and capacity to manage these concerns within the Queensland Government's existing comprehensive regulatory regime.

Uranium oxide is weakly radioactive and this differentiates it from most other mineral resources. However, uranium oxide remains stable under all conditions of storage, handling and transport and if proper procedures are followed there is little risk to handlers. A miner standing one metre from a drum of uranium oxide would be exposed to a much lower level of radiation than is allowable for an occupational radiation worker, and in one hour would receive a dose (above normal background) that is less than the dose received in one hour on a high altitude commercial flight.

These relatively low levels notwithstanding, radiation from uranium mining is still an important issue that must be safely managed to protect the environment and human health. The safe environmental management of radiation from uranium mining, milling and ore processing, are largely related to water quality and dust management, issues common across all mining operations. Ultimately, whatever the circumstances, radiation exposure should always be minimised.

In terms of human health and safety, the issues to be addressed in uranium mining and transport are similar to the issues addressed in the handling of other radioactive materials. For example, medical isotopes for cancer treatments and x-ray machines are handled safely in Queensland hospitals every day.

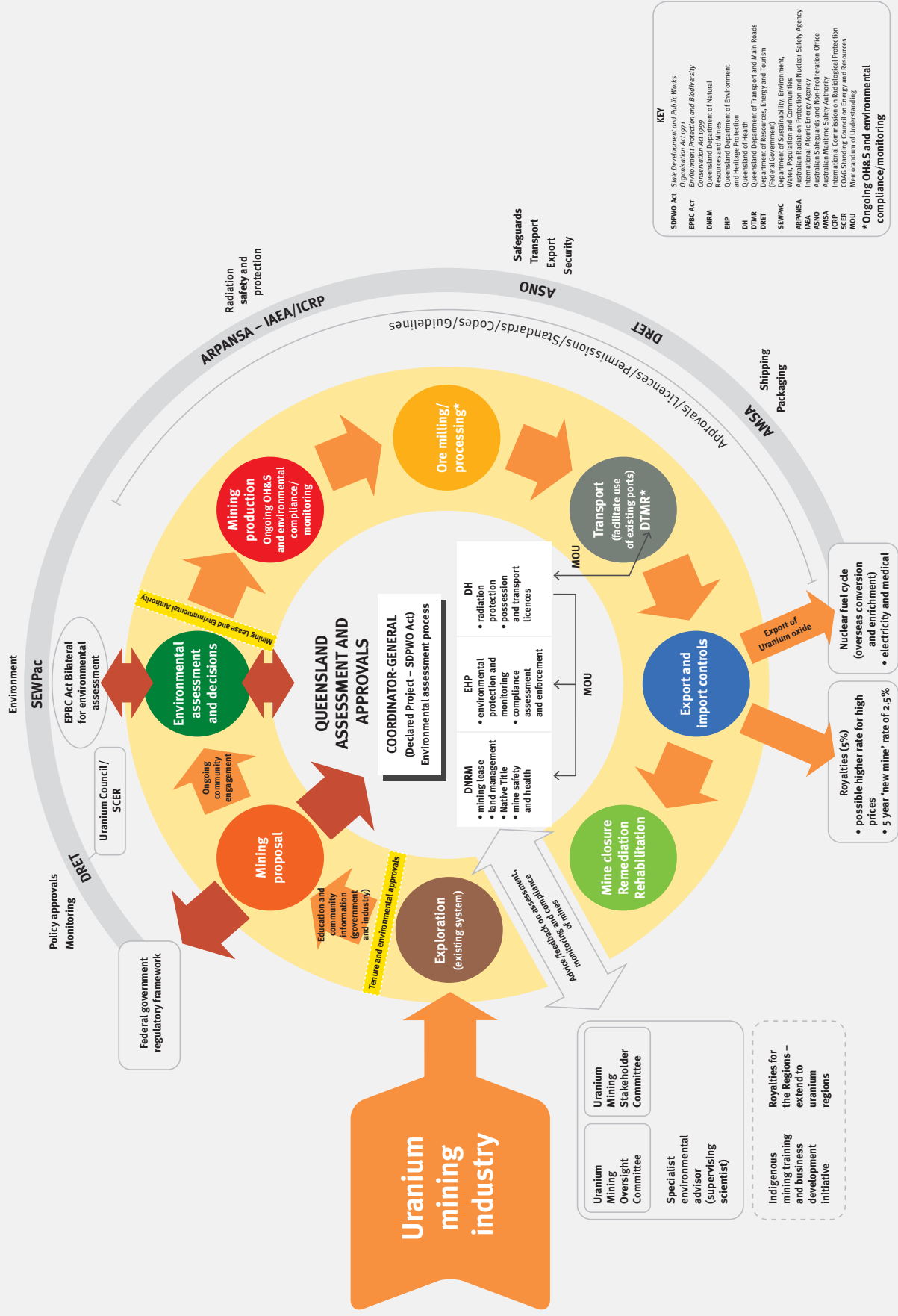
Given the relatively low levels of radiation emitted from uranium mining, the safety and regulatory concerns around the mining and transport of uranium oxide are similar to the safety and regulatory concerns around the handling of radioactive material such as medical isotopes in hospitals.

Given this, the Committee has concluded that Queensland's existing framework for the regulation of mining and radiation safety is generally appropriate for the recommencement of uranium mining in this state and that a new legislative framework is not required. The Committee has, however, made recommendations on how the existing framework can be adapted to ensure the recommencement of uranium mining meets best practice.

Figure 1 – Queensland uranium mining policy and regulatory framework, broadly illustrates the overarching best practice framework the Committee is recommending.

Queensland uranium mining policy and regulatory framework

Figure 1



1.2 Stakeholder engagement

The Committee undertook a focused program of stakeholder engagement. This included seeking submissions from a range of interested industry, environment and community groups. Submissions were invited from more than 70 groups, and public feedback was made possible through the Department of Natural Resources and Mines (DNRM) website. In all, 33 formal submissions were received. These submissions have been reviewed by an independent consultant, and the key findings and consultant's report are included as Appendix B.

Committee representatives travelled to Darwin, Adelaide, Perth and Canberra to learn from governments and companies who are currently involved with the uranium mining industry. This included a visit to the Ranger uranium mine in the Northern Territory and a meeting with the Gundjeihmi Aboriginal Corporation, which represents the Traditional Owners of the area in which the Ranger mine is situated.

The Committee also travelled to Mt Isa to hold meetings with Traditional Owners, industry, community and natural resource management groups in north west Queensland and to visit the site of the former Mary Kathleen uranium mine. Mt Isa was selected by the Committee for this visit given the number of known uranium deposits in the Mt Isa area and north west Queensland more broadly.

The Committee Chairman also undertook targeted consultation within Townsville, given its proximity to the Ben Lomond uranium deposit and its history exporting uranium from the former Mary Kathleen mine via the Port of Townsville.

A number of issues were presented clearly through formal submissions and direct stakeholder consultations. The number one lesson was the need to demonstrate to the community and Traditional Owners the stringent environmental and safety standards that will be applied to uranium mining. A key lesson from discussions with other government Ministers and officials is that uranium mining can be conducted within existing policy and legislative frameworks. This can be neatly summed up as 'when the science is mainstream, the regulation should be mainstream'.

More detailed discussion on the Committee's meetings with stakeholders can be found in Appendix C.

1.3 Report overview

The purpose and key points of chapter two to ten are outlined below.

Chapter 2 – Uranium industry background

Chapter 2 provides significant background regarding uranium mining, including the basic science behind uranium, its extraction and processing, information regarding the generally accepted principles underlying best practice for uranium mining and a snapshot of the current global uranium market.

This chapter also discusses the locations of Queensland's estimated \$10 billion in uranium deposits, approximately \$8 billion of which are concentrated in the Mt Isa region near the Gulf of Carpentaria. The chapter concludes by identifying the

key issues for consideration by all stakeholders within a best practice policy framework for uranium mining in Queensland.

Chapter 3 – Uranium industry regulation

Chapter 3 provides an overview of the current regulatory and institutional framework applied to uranium mining activities in Australia, including governance arrangements and the roles and responsibilities of the key regulatory stakeholders involved. Figure 1 – Queensland uranium mining policy and regulatory framework, illustrates the regulatory process and policy environment from exploration to production and eventual mine closure and rehabilitation within Queensland.

Chapter 3 also discusses the environmental regulation associated with uranium mining.

The approvals process will incorporate an environmental impact assessment, which can be carried out either by the Coordinator-General through the 'coordinated project' process, or by the Department of Environment and Heritage Protection under the *Environment Protection Act 1994* (EP Act).

Prior to operation in Queensland, uranium mining proponents must obtain an Environmental Authority (EA) which stipulates the environmental conditions associated with the activity. The matters for which conditions can be set under the EP Act are broad enough to address any potential environmental impacts from uranium mining. EA conditions may also include requirements for monitoring and financial assurance to ensure a mine is not abandoned without proper rehabilitation.

Chapter 3 contrasts the Australian regulatory environment with international examples, largely from Canada and the United States, and identifies the commonly accepted strengths and shortcomings of the Australian system.

Chapter 4 – A best practice approvals framework for Queensland

Chapter 4 presents the Committee's recommendations for a best practice approvals framework for uranium mining in Queensland including the following key recommendations:

- **A robust and efficient assessment process through the Coordinator-General**

The Committee's research highlighted the importance of a robust and coordinated approvals process that provides a comprehensive assessment of environmental, social, health and safety, infrastructure and agricultural impacts, while avoiding unnecessary delays.

Chapter 4 outlines the Committee's recommendation to establish a rigorous yet efficient approvals practice by processing all applications through Queensland's existing 'coordinated project' process overseen by the Coordinator-General under the *State Development and Public Works Organisation Act 1971*. The Committee also strongly supports the government's efforts towards reducing greentape and streamlining mining approvals to enhance the efficiency of the approvals process while maintaining its rigour.

It notes that uranium mining proposals in Queensland will also require Australian Government approval under the *Environment*

Protection and Biodiversity Conservation Act 1999 (EPBC Act). The Queensland Government has a bilateral agreement with the Australian Government to allow for a combined assessment process for state and federal approvals. The Committee supports the assessment of uranium mining proposals under this bilateral agreement and suggests that the Queensland Government seek the agreement of the Australian Government to this proposal.

Finally, as uranium mining has not been undertaken in Queensland since 1982, the Committee notes that Queensland Government departments involved in the approvals framework will need to collaborate closely. This includes utilising existing skills and expertise across government in environment protection, radiation management and mine safety and health. These skills will be needed for the implementation of the Committee's recommendations, the assessment of uranium mining proposals and oversight of the industry during the operational and rehabilitation phases of uranium mining.

- **An oversight committee and specialist advisor**

To coordinate this process and to oversee the implementation of the recommendations in this report that are accepted by the government, the Committee recommends that a Uranium Mining Oversight Committee (UMOC) be established. The UMOC should include high level membership from all relevant departments, and be chaired by a representative from DNRM. Suggested Terms of Reference for the UMOC are at Appendix D to this report.

The Committee has found that the Queensland Government's skills and expertise in assessing, monitoring and administering uranium mining may need to be supported with outside expertise. An independent, experienced and authoritative specialist advisor to the UMOC could give stakeholders and the general public added assurance that the best practices and most recent science are being applied to the oversight of uranium mining. It could also enhance the transparency and accountability of the compliance and monitoring program, including audits of each mine's environmental performance. The specialist adviser should have significant practical experience of uranium mining and its associated environmental and radiation management issues.

The Australian Government's Department of Sustainability, Environment, Water, Population and Communities contains the Supervising Scientist Division (SSD). The SSD was established following the Australian Government's decision to approve uranium mining in the Northern Territory. It is an independent supervisory body established to ensure that the Alligator Rivers Region of the Northern Territory is protected from the potential environmental impacts of uranium mining activities.

The SSD has significant experience, expertise and scientific resources and would meet the UMOC's requirement for an independent specialist advisor. The Committee recommends that the Queensland Government approach the Australian Government to appoint the SSD in this role.

- **A stakeholder committee**

Both written submissions and direct consultation with stakeholders and regulators emphasised the importance of

meaningful engagement with stakeholders to build confidence in the uranium mining industry. This includes providing the public with transparent, factual information about uranium and uranium mining. The Committee suggests that the UMOC oversees the development of strategies to inform the community about the uranium mining industry. These strategies need to be developed in conjunction with the industry and the Australian Government expert agencies, such as the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) and the SSD.

The Committee further recommends that a Uranium Mining Stakeholder Committee (UMSC) be established to allow local communities impacted by uranium mining to discuss their concerns and expectations in detail prior to, and during, the assessment of uranium mining proposals. The UMSC should be supported by government departments and uranium mining representatives to give these local communities access to both the project proponent and the Queensland Government officials involved in the assessment process. Membership of the UMSC should be extended to local governments, Traditional Owners, environment groups and natural resource management groups.

Local communities should have the opportunity for continued involvement in the UMSC during the operational and rehabilitation phases of a uranium mine, so that community members can be given detailed information about a mine's performance. Suggested Terms of Reference for the UMSC are at Appendix D to this report.

- **Interstate cooperation on the transport of uranium**

In 2011–12, almost 7000 tonnes of Australian uranium product was transported for export. In comparison, 300 million tonnes of Australian coal was transported for export over the same period. Australia's coal is mostly transported by coal trains which can carry up to approximately 8500 tonnes of coal, based on the larger trains used. Uranium is typically transported in standard 20 foot shipping containers, which in 2011–12 totalled 395 individual containers.

Currently, uranium oxide is exported from Australia through either Adelaide or Darwin. The quantities of uranium oxide likely to be produced in Queensland make it unlikely that a new shipping route will be established from a Queensland port in the near future, if at all.

The Committee has held discussions with the Northern Territory Government at ministerial and departmental levels. These representatives indicated their support for the possible transport of uranium oxide from Queensland to Darwin, for export through Darwin. The Committee also met with representatives of the Government of South Australia to discuss the transport of uranium. Transport management plans in South Australia must be approved by the Government of South Australia. Uranium mining companies and the Queensland Government will need to cooperate with the Government of South Australia on the development of any transport plan that affects South Australia.

The Committee recommends that the Queensland Government work with the Northern Territory, South Australian and Western Australian governments to establish an inter-state committee

to oversee and harmonise transport and logistics associated with the uranium mining industry. This should include any work required for the mutual recognition of transport licences. While this work needs to be driven by the states that are involved in the uranium mining industry, the Australian Government will also need to be involved.

The Committee recommends that uranium oxide mined in Queensland be exported via existing ports and shipping lanes for the export of uranium oxide. Queensland ports should be encouraged to seek additional business from the activity uranium mining will present in terms of materials supplied for construction, maintenance and mining operations. If a future request is made to export uranium oxide from a Queensland port, this request should be assessed by the Coordinator-General and the existing regulation for the transport and export of this class of material should be applied.

Chapter 5 – Environmental impact and protection

Chapter 5 examines the environmental considerations surrounding uranium mining and compares this with the environmental considerations for other metalliferous mining operations, such as gold and copper. The Committee found that, as for other metalliferous mining operations, the main environmental issues for uranium mining are:

- surface water impacts from tailings dams (failure or overtopping), dewatering flooded pits and acid mine drainage from waste rock dumps
- groundwater impacts from in situ recovery (ISR) operations or leaching from tailings dams
- voids (pits and mine shafts) and associated groundwater impacts
- land clearing resulting in loss of species and habitat
- mine rehabilitation, mine closure and final land use issues.

As with other metalliferous mining, uranium mining can have significant impacts on the environment. An effective regulatory system will minimise and manage the environmental risks associated with this activity.

Best practice environmental management

Chapter 5 discusses the community expectation that mining be carried out to the highest environmental standards, particularly uranium mining. The Queensland Government has recognised this community expectation in its process to assess EA applications for mining proposals. All mining proposals in Queensland are assessed against the standard criteria which are contained in Schedule 4 of the EP Act. The standard criteria include best practice environmental management (BPEM) and technologies associated with achieving BPEM. The key concepts of the standard criteria are applied during the assessment and conditioning of the EA. As described previously in the report, the EA contains the operational rules that the company must operate under at each mine site.

The Committee believes that BPEM is the best possible way of conducting activities for a given site so that the impact on

the environment is minimised. As new challenges emerge and new solutions are developed, or better solutions are devised for existing issues, it is important that BPEM be flexible and innovative in developing solutions that match site-specific requirements.

Outcome-based regulation

Chapter 5 also discusses the need for outcome-based regulation that focuses on what should be achieved, rather than prescriptive regulation that focuses on the process to achieve the objective. For example, outcome-based conditions for air quality may set maximum limits on the release of air contaminants but allow the mine operator to determine the best method to meet those limits. By contrast, prescriptive conditions would specify the method of achieving the release limits such as the location of release points and emission rates.

The Queensland Government is currently preparing model outcome-based conditions for the mining industry. These model conditions should be reviewed for relevance to the uranium mining industry and where necessary model outcome-based conditions specific to uranium mining should be developed.

Water quality

Water quality was a common and important theme raised through consultation and in direct submissions from stakeholders. Initial and operational planning for a uranium mine must consider the protection of water quality in the surrounding environment. This must also factor in the potential for high rainfall events during the life of the mine. Chapter 5 addresses these factors.

Auditing

Across Australia, regulatory frameworks involving independent third party certification are widely used to provide assurance that regulated activities are completed or being conducted in accordance with regulatory requirements. For government departments, the use of independent third party certification provides an efficient and effective way of ensuring technical assessments are adequate, particularly where relevant technical specialist expertise may not be readily available within government. For the community, including those members carrying out regulated activities, the use of third party certification provides a way of ensuring that all regulatory requirements associated with a particular activity are being met.

The Committee recommends that third party auditors be used to augment the in-house expertise of the Queensland Government's regulators and that the government, industry and the third party auditors consider using the technical expertise and services of the SSD.

Radiation protection

As members of the proposed UMOC, the Department of Environment and Heritage Protection (EHP) and Queensland Health's Radiation Health (QH-RH) unit will have a shared responsibility to manage the environmental risks from radioactive materials. It is important that officials from the two departments work closely to avoid duplication in roles and

responsibilities, and to ensure there are no gaps in regulatory oversight. It is recommended that this cooperation be formalised by updating the Memorandum of Understanding (MOU) between EHP and QH-RH.

Chapter 6 – Safety and health

The Committee has determined that safety on mine sites in Queensland is currently well regulated under the *Mining and Quarrying Safety and Health Act 1999*, and the *Radiation Safety Act 1999* which provides for radiation safety. This legislation covers on-site and off-site mining activities, including post mine closure.

The current mining legislation provides a framework for the safe and healthy operation of uranium mining and processing, however, the Committee has found there is a need to update some of Queensland's existing documentation and to develop additional mandatory guidelines and advisory guidance to ensure that best practice is maintained at all stages of uranium exploration, mining and processing. The mine safety division of DNRM has undertaken to do this.

Another important human health measure is Queensland's participation in the Australian National Radiation Dose Register (ANRDR). This records the levels of radiation exposure for workers in the uranium mining industry on a national database to ensure this exposure remains well within acceptable limits. The Committee recommends that the Queensland Government should also devise an internal state monitoring regime to ensure that radiation risks from naturally occurring radioactive materials are kept within acceptable levels in Queensland.

Chapter 7 – Economic and community development

Chapter 7 examines how the state and local communities impacted by uranium mining may maximise the economic benefit from this activity.

Mary Kathleen 'rare earth' minerals

The Committee notes the commitment by the Honourable Andrew Cripps MP, Minister for Natural Resources and Mines, to investigate the redevelopment of Mary Kathleen for rare earths subject to assessment of site safety and environmental issues. This investigation provides an opportunity to also examine further uranium mining activities at Mary Kathleen.

While the resources at Mary Kathleen had been exhausted commercially based on the previous uranium only operation, it is likely that it will be more viable when mined with other minerals. A tender process could also provide an opportunity for further rehabilitation of the former mine site at Mary Kathleen by making that a condition of the tender process.

Social impacts and resources for the regions

The Committee found that Queensland's existing system of social impact assessment (including proposed changes) and the recent addition of the Royalties for Regions (R4R) program appear more comprehensive than comparable Australian jurisdictions or international examples, and should be applied to any potential uranium mining projects.

The Queensland Government has a comprehensive approach to delivering positive regional outcomes from resource projects. Detailed social impact assessments and management plans are a mandatory element of the environment impact assessment of coordinated projects by the Coordinator-General. This assessment also includes consideration of cumulative impacts from multiple projects within a region.

The Committee recommends that the Queensland Government investigate the extension of the R4R program to those areas where uranium mines may be developed.

Compensation frameworks in Queensland

A concern raised by the Committee and stakeholders is the coexistence of agriculture alongside the development of the uranium mining industry. The Committee considers that the current framework of compensation rights to landholders and the protection of strategic cropping land from mining is appropriate for the recommencement of uranium mining. However, as discussed in Chapter 5, the high environmental performance required of uranium mines will be the key to maintaining the confidence of the agricultural and fisheries industries.

Research undertaken by the Committee identified that compensation mechanisms are available to agricultural landholders through land access laws and compensation arrangements for mining leases. This will allow landholders, including farmers, to influence the conduct of resource activity on their land, and to be fairly compensated for any significant impacts. There is a role for the UMOC to assist with informing and educating landholders regarding this framework.

Chapter 8 – Opportunities and considerations for Indigenous Queenslanders

The Committee focused particularly on the need and opportunities to ensure that Queensland's Indigenous communities benefit from any uranium mining activities on or near their traditional land.

The Committee found significant potential for the uranium industry to create real job opportunities for Indigenous Queenslanders, both through direct industry employment and supply-chain opportunities for Indigenous businesses.

The overwhelming majority of Queensland's uranium deposits are located in north west Queensland, where the resources sector has been partnering with government to find ways to address the ongoing challenge of increasing Indigenous employment.

Despite these efforts, rates of Aboriginal employment in mining in the north west have declined in recent years. In order to fully capitalise on future job opportunities, government and industry must work together on new approaches that address the work-readiness of Indigenous people and businesses.

Accordingly, the Committee recommends that the Queensland Government work with industry and community stakeholders to establish a new training and business development initiative to

help Indigenous people take full advantage of the jobs on offer within the uranium mining industry, and other new opportunities in the resources sector. Such an initiative should consider how government and not-for-profit organisations can help improve outcomes from industry-led employment and training programs for Indigenous people.

This initiative could be in the form of a charitable trust arrangement which could provide a sustainable source of funding for projects which support training, employment and business development outcomes. A proposal for this trust arrangement is outlined at Appendix E.

A Memorandum of Understanding (MOU) is already in place between the Queensland Government and the Queensland Resources Council (QRC) to encourage employment of Indigenous people in the resources industry. The Queensland Government should continue negotiations with the QRC on an updated MOU which outlines agreed priorities for increasing Indigenous economic participation in the resources sector, including those suitable for support by a charitable trust, as well as those more appropriately implemented directly by government or industry.

Native Title rights

The Committee is eager to ensure that Indigenous communities and Traditional Owners benefit directly from the value of the resources that are mined from their country. It believes that existing frameworks, such as Indigenous Land Use Agreements, can deliver these benefits. The Queensland Government should not substantially differentiate uranium from other significant resource projects in the application of statutory processes related to the interests of Indigenous communities. However, the Committee does see a potential need for the Queensland Government to advocate for the Australian Government to examine measures to minimise demands placed on Traditional Owner groups created by negotiating with multiple mining companies under Commonwealth laws.

Environmental and social impacts

Consultation with Indigenous communities enabled the Committee to identify the concerns of these communities regarding the potential impacts from uranium mining on the environment and human health. For example, Indigenous communities are concerned about the impact of uranium mining on traditional hunting grounds and sources of bush tucker. The Committee recognises this concern and considers the rigorous approval process and standards to be applied to uranium mining, as discussed in detail in Chapters 4 and 5, should protect traditional hunting grounds and bush tucker.

This consultation also reaffirmed the need for extensive public consultation and education on uranium and uranium mining, both before mines are approved and during the operational phases. The Committee considers the steps outlined in Chapter 4 will lay the groundwork for this consultation and education.

As discussed in Chapter 7, Queensland has a comprehensive process to assess the social impacts of resource projects through the Coordinator-General's processes. The Queensland

Government should consider how changes to the social impact assessment process can encourage greater consistency, transparency and alignment with government programs in the management of social impacts on Indigenous communities.

Chapter 9 – Resource royalties and charges

Chapter 9 focuses on setting an appropriate level of royalties and charges to ensure a fair return to the people of Queensland while encouraging economic investment from uranium mining companies. The Committee recommends that the Queensland Government sets a royalty rate of 5 per cent for uranium, consistent with other states. However, the Committee believes the government should also ask Queensland Treasury to investigate applying a higher royalty rate for when uranium prices are particularly high.

Given the increasing global competition for capital for new uranium projects, and infancy of the Queensland uranium industry, the Committee considers it reasonable that a concessional rate be applied during the early years of all new Queensland uranium mines.

In addition to payment of royalties, the Committee recommends the uranium mining industry face the usual cost recovery mechanisms that are applied to other mines. Consistent with the overall findings that uranium mining should proceed largely within the existing approvals framework for other resource projects, the Committee does not see a need for a schedule of fees to apply specifically to uranium mining.

Chapter 10 – Conclusion and way forward

Chapter 10 provides a summation of the Committee's conclusions, namely that, while a new legislative framework is not required to support the recommencement of uranium mining in this state, the existing framework will need to be adapted to ensure that it meets best practice. The Committee believes that implementing the recommendations in this report will deliver the necessary adaptation and provide Queensland with the best possible tools and mechanisms for a successful, sustainable, and responsible uranium mining industry.

Important factors determining the timing of any new uranium mining project in Queensland is the economic context at the time, market conditions, outlook, and a company's ability to raise capital to finance new mining developments. Commencement of the approvals process will be determined by individual project proponents, and other variables such as Australian Government approvals, and the mine's location and surrounding environment, will all influence timing.

Regardless of the timeframe to the first uranium mining proposal in Queensland, it is important that the Queensland Government move quickly to implement the recommendations of this report so that the best foundations can be laid for the recommencement of the industry in this state. By establishing the UMOC to oversee the implementations from this report that are accepted by the Queensland Government, these foundations can be in place in time for the first uranium mining proposals to be presented for assessment.

1.4 Committee recommendations

As many aspects of uranium exploration and mining are like any other mineral, the Committee has resolved that the existing regulatory framework is generally suitable to accommodate the recommencement of uranium mining, with some adaptations. The Committee recommends the following adaptations to achieve a best practice regulatory framework for uranium mining. These recommendations are based on the Committee's deliberation and stakeholder feedback (all recommendations are numbered in accordance with the chapters of the report).

4. Best practice approvals framework for Queensland

- 4.1 The Queensland Government should establish a policy for all uranium mine proposals to be assessed by the Coordinator-General as a 'coordinated project' under the *State Development, Public Works Organisation Act 1971* (SDPWO Act), with the policy subject to review by the Resources Cabinet Committee once the process is established, but not before two years after the first proposal is received. If adopted, the Committee encourages the development of a detailed whole-of-government approvals chart to demonstrate the coordinated projects process to the industry and to demonstrate the rigour of the approvals process to the public.
- 4.2 The assessment of a uranium mine for the purposes of the *Environmental Protection and Biodiversity Conservation Act 1999* (Cwlth) (EPBC Act) should be undertaken according to the bilateral agreement between the Queensland and Australian Governments. The Queensland Government should seek the agreement of the Australian Government to assess all uranium mining proposals in Queensland under this bilateral agreement.
- 4.3 The Queensland Government should facilitate and attract investment from industry by providing an approvals process that is efficient and provides certainty regarding the expectations placed on industry. Therefore, along with assessing uranium mining proposals as 'coordinated projects', the Committee strongly supports initiatives such as the Department of Environment and Heritage Protection's (EHP) Greentape Reduction project and the Department of Natural Resources and Mines' (DNRM) Streamlining Approvals project to enhance the efficiency of the approvals process while maintaining its rigour.
- 4.4 A whole-of-government Uranium Mining Oversight Committee (UMOC) should be established to oversee uranium mining implementation, operations and rehabilitation in Queensland. This should include high level membership from all relevant departments and be chaired by the Department of Natural Resources and Mines. The UMOC should:
 - guide the implementation of the recommendations in this report that are accepted by the Queensland Government
 - provide advice to the Coordinator-General during the assessment process

- oversee the compliance and performance of uranium mines during the operation and rehabilitation phases.

The Committee has recommended an indicative Terms of Reference for the UMOC in Appendix D.

- 4.5 The Queensland Government should seek independent specialist advice to the UMOC, with expertise in managing the environmental performance of uranium mining.
- 4.6 To this end, the Queensland Government should approach the Australian Government on using the Supervising Scientist Division (SSD) for this specialist advice.

Communication and consultation

- 4.7 The Queensland Government and industry should establish a Uranium Mining Stakeholder Committee (UMSC) that is supported by the UMOC. The UMSC should include representatives from local governments, Indigenous groups, industry, environment and natural resource management groups. The Committee has recommended indicative Terms of Reference for the UMSC in Appendix D.
- 4.8 The UMOC should be responsible for ensuring that appropriate communication and education strategies are developed to inform the community about uranium mining. These strategies need to be developed in conjunction with industry and the Australian Government's expert agencies.

Tenure

- 4.9 No changes are required to the current tenure framework as it is sufficiently robust and can capture uranium activities.

Transport

- 4.10 The Queensland Government should work with the Northern Territory, South Australian and Western Australian governments to establish an inter-state committee to oversee and harmonise transport and logistics associated with the uranium mining industry, including the mutual recognition of transport licences and the consideration of individual or company licensing of transport operators. The Australian Government should also be invited to attend this committee and it should also cooperate with the Uranium Council.
- 4.11 The focus of Queensland's efforts should be on facilitating the use of existing ports and shipping lanes by industry for the export of uranium.
- 4.12 As the uranium mining industry is unlikely to export uranium through Queensland ports, the Queensland Government should encourage these ports to seek additional business from the activity that uranium mining will present in terms of materials supply for construction and maintenance, and mining related goods.
- 4.13 If the Queensland Government does receive a request to export uranium through a Queensland port, the request should be assessed by the Coordinator-General as a coordinated project and existing regulation for the transport and export of Class 7 Dangerous Goods (Radioactive Material) be applied.

- 4.14 As part of streamlining the current regulatory process for uranium transportation, a Memorandum of Understanding (MOU) should be developed between Queensland Health and the Department of Transport and Main Roads (TMR) regarding transport compliance inspections.
- 4.15 As radiation safety regulator, Queensland Health should develop and implement guiding principles for emergency response with the Australian Uranium Association specifically for Queensland, in a similar fashion to that undertaken by the Western Australian Government. Queensland Health should also conduct education and training for emergency workers regarding response and procedures for uranium emergency responses.

5. Environmental impacts and protection

- 5.1 In line with the Queensland Government's commitment to develop outcome-focused model conditions for mining approvals, model conditions developed for Environmental Authorities (EA) should be reviewed for relevance to the uranium mining industry and where necessary model conditions specific to uranium mining should be developed. The model conditions for EAs should consider best practice environmental management and focus on achieving positive environmental outcomes rather than specifying prescriptive measures.
- 5.2 The initial and operational planning stages of a uranium mine must consider the potential water quality impacts of mining and should specify how water quality will be protected during high rainfall events that may be expected during the life of a mine. Specific consideration should be given to the effects of climate change on the scale and frequency of rainfall events and the potential mobilisation of radionuclides that may impact on environmental values.
- 5.3 The Australian Government's leading practice guidelines should be used to manage and minimise the risks associated with in situ recovery. Any proposed in situ recovery operation must be considered with regard to potential impacts on groundwater resources generally and the Great Artesian Basin particularly.
- 5.4 The MOU between EHP and Queensland Health should be reviewed with the aims of:
- recognising that uranium mining is likely to be conducted in Queensland in the future
 - incorporating the expert advice of Queensland Health's Radiation Health Unit in the assessment and regulation of uranium mines in Queensland.
- 5.5 EHP should review uranium mining rehabilitation guidance material with particular consideration to the need for rehabilitation goals, objectives and completion criteria specific to uranium mining.
- 5.6 The normal financial assurances for mine rehabilitation should be applied to the uranium industry.
- 5.7 Third party auditors should be used to augment the in-house expertise of regulators in Queensland.

- 5.8 The Queensland Government, third party auditors and industry should consider using the technical expertise and services of the SSD.

6. Safety and health

- 6.1 The Queensland Government should continue to oversee health and safety on uranium mine sites through the existing mining legislation as it provides a workable framework for the safe and healthy operation of uranium mining.
- 6.2 The Queensland Government should update its safety guidelines for industry by drafting three documents based on ARPANSA guidelines (containing mandatory and advisory actions) on the following:
- exploration (based on the current guidance note QGN12)
 - uranium mining
 - uranium milling and ore processing operations.
- 6.3 Selected mines inspectors should undertake training as radiation safety officers for naturally occurring radioactive material (NORM), so they can conduct proportionate and consistent assessments of radiation management plans and provide technical advice regarding radiation safety in mining.
- 6.4 Queensland Health and DNRM should continue to develop their collaborative approach by way of a formal MOU. Consideration should be given to forming a regulator working group operating under an MOU.
- 6.5 The Queensland Government should fully support the use of the Australian National Radiation Dose Register (ANRDR), including:
- submission of occupational radiation exposure data from all Queensland uranium mining operations to the ANRDR
 - efforts to expand the ANRDR scheme to cover all workers in Australian mining operations involving occupational exposure to naturally occurring radioactive substances, however categorised (i.e. uranium, NORM, mineral sands or rare earth mining).

The Queensland Government should also devise an internal state monitoring regime to ensure that radiation risks from naturally occurring radioactive materials are kept within acceptable levels in Queensland.

7. Economic and community development

- 7.1 The Queensland Government should continue investigations into the redevelopment of Mary Kathleen. In addition to the commitment to pursue rare earths, these investigations should consider the opportunities for producing uranium as a byproduct of rare earths production, and the possibility of including rehabilitation requirements as part of any tender process to release tenure.
- 7.2 The Queensland Government should investigate extending the Royalties for Regions (R4R) program to those areas where uranium mines may be developed.

- 7.3 The current framework of compensation rights to landholders and the protection of prime agricultural land from mining should be maintained as it is appropriate for the recommencement of uranium mining. The UMOC should inform and educate landholders regarding this framework.

8. Opportunities and considerations for Indigenous Queenslanders

- 8.1 The Queensland Government should establish a 'mining training and business development initiative' for Indigenous Queenslanders in cooperation with industry to address the barriers preventing Indigenous people from taking full advantage of the jobs on offer in the resources sector. This could potentially be in the form of a charitable trust arrangement which could provide a sustainable source of funding for projects which support training, employment and business development outcomes. A proposal for this trust arrangement is outlined in Appendix E.
- 8.2 The Queensland Government should continue negotiations with the Queensland Resources Council on an updated MOU which outlines agreed priorities for increasing Indigenous economic participation in the resources sector, including those suitable for support by a charitable trust, as well as those more appropriately implemented directly by government or industry.
- 8.3 The Queensland Government should not substantially differentiate uranium from other significant resource projects in the application of statutory processes related to Indigenous interests.
- 8.4 The Queensland Government should consider how any future changes to the social impact assessment process can encourage greater consistency, transparency and alignment with government programs in the management of social impacts for Indigenous communities.
- 8.5 The Queensland Government should advocate for the Australian Government to examine measures that minimise demands placed on Traditional Owner groups created by negotiating with multiple mining companies under Commonwealth laws.

9. Resource royalties and charges

- 9.1 A competitive royalty rate of 5 per cent should be introduced for uranium which is consistent with other states.
- 9.2 A higher stepped royalty rate should be investigated by Queensland Treasury and Trade that could come into force when market prices for uranium are very high.
- 9.3 The Queensland Government should consider a 'new mine' concessional royalty rate of 2.5 per cent, regardless of the price of uranium, for the first five years of each new mine's life.
- 9.4 The usual cost recovery mechanisms applicable in Queensland should be applied to uranium, including tenure and environmental authority application fees, rent and the safety and health levy. Any additional assessment or monitoring costs as a result of uranium mining should be recovered from industry.

2. Introduction and background

This chapter presents the key drivers behind the report and a discussion of Australia's current and past uranium mining industry and activities. The basic science behind uranium and the methods of its extraction and processing are described. The latest snapshot of global demand and supply is also provided. Lastly, this chapter highlights generally accepted principles underlying 'best practice' for uranium mining, and identifies the key issues that require consideration within a best practice policy framework for uranium mining in Queensland.

The Committee acknowledges the following entities as significant general sources of information throughout this chapter on background, factual information, history, science, and state of the industry:

- Queensland Resources Council (QRC)
- Australian Uranium Association (AUA)
- World Nuclear Association
- Uranium Council
- International Atomic Energy Association (IAEA)
- Australian Radiation Protection and Nuclear Safety Agency (ARPANSA)
- federal Department of Resources, Energy and Tourism (DRET).

2.1 Preliminaries

On 22 October 2012, the Queensland Government announced that uranium mining would be allowed to recommence within Queensland, reversing a long-held position that had effectively prevented uranium mining in Queensland since 1989 when the Goss Labor Government instigated a ban (Mary Kathleen ceased mining operations in 1982, prior to this ban).

In recognition of the significant community interest associated with this decision, the Queensland Government announced the formation of the Uranium Mining Implementation Committee (the Committee). The Committee's role was to engage with key stakeholders and advise on the best practice framework to ensure that uranium mining recommences according to the best environmental and safety standards, while maximising the commercial opportunities for uranium extraction.

The Secretariat had full-time staff from the Department of the Premier and Cabinet (DPC) and the Department of Natural Resources and Mines (DNRM), and input or support was also provided by the following:

- Department of State Development, Infrastructure and Planning (DSDIP)
- Treasury and Trade
- Queensland Health
- Department of Transport and Main Roads (TMR)
- Department of Environment and Heritage Protection (EHP)
- Department of Aboriginal and Torres Strait Islander and Multicultural Affairs.

Broadly, the Committee was required to consider a range of issues including environmental safeguards associated with the mining, transport and export of uranium; uranium mining
Recommencement of uranium mining - a best practice framework.

rehabilitation requirements, standards and the use of appropriate financial or other assurances; work place health and safety standards; and economic opportunities resulting from the recommencement of uranium mining.

While Queensland has a long history and expertise in the regulation of the mining and resources sector, and has a robust regulatory framework in place that can also be applied to uranium, there is significant community interest in the mining of uranium resources. In particular, there is interest both in terms of the potential risks associated with mining, processing and exporting uranium products, and with the potential economic and social gains that may accrue to the community from a recommenced and successful uranium resource industry.

The Committee therefore engaged with a range of stakeholders to ensure a diverse range of views were considered and a balanced approach adopted. This included other state and territory governments, peak bodies, community and Indigenous groups, and local government. Key environment groups were invited to be part of the Committee's process and provided submissions to the Committee.

The Terms of Reference did not include examining the Queensland Government's policy decision to recommence uranium mining, considering nuclear energy production or nuclear waste disposal plants in Queensland. This is outside the scope of the Queensland Government's decision to recommence mining uranium. (The Committee's full role and scope are detailed in its Terms of Reference, included in Appendix A).

Structure of report

In recommending application of a best practice framework, the Committee has structured this report consistent with its Terms of Reference, but also in a logical manner raising considerations along the entire mining supply chain from exploration to export and the various key interactions across this supply chain such as environmental, social and community issues, as well as safety and health.

To assist in providing a logical process throughout the report, particularly in terms of regulatory considerations, the Committee has conceptualised the task as 'approvals framework' considerations and 'operational framework' considerations.

2.2 Introduction and background

Key observations

Australia has the world's largest known supply of uranium, estimated at 33 per cent of the world total, recoverable at reasonable cost. It is the world's third largest producer of uranium, behind Kazakhstan and Canada, supplying approximately 19 per cent of world demand.

In 2011-12 Australia exported approximately 7000 tonnes of uranium oxide (the energy equivalent of 140 million tonnes of thermal coal) at a value of more than A\$600 million. Key Australian uranium export markets in 2011-12 were North America (39.5 per cent), Asia (40.2 per cent) and Europe (20.3 per cent).

The primary use of uranium in an enriched form is as fuel in nuclear reactors. It has the advantage of being energy dense. Power reactors are used for domestic electricity generation, while smaller reactors power submarines, ice-breakers, and aircraft carriers. Specially designed reactors such as Australia's Opal facility at Lucas Heights, west of Sydney are used to produce radioisotopes which have applications in medicine, food and safety, as well as neutron beams for a wide range of basic and applied research.

Australia's uranium is produced wholly for export for peaceful energy production to the countries that meet Australia's strict safeguards and non-proliferation requirements. Uranium mining in Queensland can only operate in this context.

A miner standing one metre from a drum of uranium oxide would be exposed to a much lower level of radiation than is allowable for an occupational radiation worker, and in one hour would receive a dose (above normal background) that is less than the dose received in one hour on a high altitude commercial flight.

In Queensland, total major uranium resources are currently estimated to be 100,000 tonnes (based on company statements that comply with standard financial reporting requirements). The proportion of total major uranium resources in Queensland that are recoverable at less than US\$130 a kilogram are estimated to be approximately 40,000 tonnes (based on Nuclear Energy Agency/International Atomic Energy Agency standards).

The Committee understands that Queensland already has significant industry interest in developing these uranium resources, particularly in known deposit areas around Mt Isa, west of Townsville, north west Queensland, and possibly the Gulf area.

In terms of the world uranium market, prices peaked at US\$136 per pound in mid-2007. The nuclear accident at the Fukushima nuclear reactor in Japan in March 2011 undermined confidence in nuclear energy more generally. The spot price of uranium oxide, which had already retreated from highs of US\$72 per pound reached in January 2011, fell steeply. Although there was a subsequent rebound, spot uranium prices continued to drift lower to approximately US\$52 per pound by the end of 2011. The spot price has remained subdued during 2012, and averaged US\$43 per pound in the first two months of 2013.

However, prevailing market conditions coupled with medium and long-term forecasts suggest that the fundamental drivers of uranium demand have not changed. China and India, together with other countries such as South Korea, are expected to continue their nuclear energy programs, boosting both the demand for nuclear energy and the price of uranium. There will be a continuing need for exploration, mining and milling of uranium to supply this increasing global demand for uranium in energy production.

The current subdued market for uranium is therefore not expected to greatly impact on the potential market for Queensland's uranium exports given the significant lead times associated with commencing mining operations.

To capitalise on this medium to long-term demand, Queensland's uranium industry will need to be responsive to the demands of governments, consumers, shareholders, competitors, investors and communities. The industry will need to balance their pursuit of economic gain

with environmental and social concerns and, by doing so, demonstrate their contribution to sustainable development. This will mean operating within a best practice framework.

The Committee has been presented with a range of domestic and international examples of best practice principles, standards and processes that can be directly applied to a uranium mining industry in Queensland.

Broadly, 'best practice' involves three basic elements applicable to regulators, proponents and stakeholders: the mandatory framework of regulations, laws and policies; adherence to leading practice standards, guides, and to practice continual improvement, transparency and consultative methods; and addressing 'social license' issues specific to mining uranium.

Not surprisingly, a best practice policy and regulatory framework for uranium mining in Queensland will consider both the approvals environment and operational environment, from exploration to the point of export. A robust framework must address the key considerations of: governance, communication and consultation, tenure and land management, environment impacts and protection, mine safety and health, radiation protection and security, Native Title and Indigenous considerations, economic, industry and community development, social impacts and an appropriate mineral royalty and regulatory cost recovery system.

2.2.1 Drivers of the report

Opportunity and potential

While mining of uranium has not occurred in Queensland since 1982 when the former Mary Kathleen mine near Mt Isa ceased operations. The *Mineral Resources Act 1989* does not expressly prohibit mining of uranium or any other mineral. Exploration for uranium has been allowed, and exploration companies have continued to actively explore for uranium in Queensland. This exploration activity has resulted in significant and continued interest in known deposits from the industry.

The Queensland Government's decision to lift the ban on uranium mining has been welcomed by the Queensland mining industry, but has raised a number of concerns, in particular about the Queensland Government's capacity and preparedness to regulate uranium mining. The general community also expressed concerns about health, safety and environmental risks associated with the mining of uranium including water pollution, radioactive waste management, and transport and export issues.

The Government has made its reasons clear for reconsidering its policy position and allowing the recommencement of uranium mining in Queensland. Given the Australian Government's position, the Queensland Government stated that it sees no grounds to continue to stop Queensland from gaining the significant economic benefits of uranium mining. It noted that uranium industries have been successfully developed in these jurisdictions and deliver jobs, regional resources and development, and royalties.

While the Queensland Government has stated that it is aware of the strong opposition from some stakeholders to uranium mining, it has also been clear that recent events have made it necessary for Queensland to actively investigate the issues and prospects more closely. The

Queensland Government has also clearly stated that nuclear power plants or waste disposal are not on its agenda. The recommencement of uranium mining will contribute to the Queensland Government's commitment to establish a four pillar economy, strengthen the resources industry and promote the state's attractiveness for exploration.

In addition to political drivers, and despite international responses to the Fukushima incident, global demand for uranium continues to grow, and the Australian uranium industry is well-placed to provide for this demand. With new mines expected to come online and expansions occurring over the short to medium term, the outlook for the industry remains strong.

Political influences

At a national level, Australia's policy has been that uranium will not be used for power generation domestically. After winning the 1983 federal election, the Australian Labor Party (ALP) adopted a 'three mines policy' at a national level, agreeing to continued production only at the then-currently operating uranium mines (Nabarlek and Ranger), as well as Olympic Dam, which was then in the planning stages. This 'three mines policy' effectively ended following the election of the Howard Government in 1996.

Since 2007, the ALP has followed a new policy. At a national level, it supports uranium mining. An example of this support came in 2012, when the Prime Minister of Australia, the Honourable Julia Gillard MP, held trade talks with countries including India about the benefits of buying uranium produced within Australia. Individual states and territories are permitted to choose whether, and to what degree, to permit uranium mining and exploration.

Uranium mining is permitted in South Australia and the Northern Territory (which together host the four existing mines). Mining is also permitted in Western Australia, where attractive projects are being developed and where the first new mine could be in production during 2013. In early 2012, the New South Wales Government announced uranium exploration would be permitted in the state. Mining for uranium remains prohibited. Thirty nine expressions of interest for exploration licenses covering uranium were submitted during the expression of interest stage - September to November 2012.

In Queensland, the Goss Labor Government prohibited the mining of uranium (while allowing exploration) when it was elected in 1989, albeit at a policy, rather than a legislative level. The Queensland Government's announcement in October 2012 to end the prohibition will allow uranium mining to occur for the first time since the end of the 'three mines policy' and the state ban.

2.2.2 Uranium industry and resources in Australia

Defining uranium and radioactivity

While the Committee has tried to avoid becoming overly complex or technical, it is important to define 'uranium' and 'radioactivity' for the purposes of discussion. In principle, an extensive and nuclear physics-correct description of uranium and radiation is desirable. However, for the purposes of the report, the Committee has attempted to keep the definitions simple and describe only the basic relevant concepts of uranium and radiation.

Unless otherwise stated, the generic term 'uranium oxide' is favoured in this report for consistency to describe the transportable product of uranium processing rather than 'yellowcake' and 'U₃O₈'.

Uranium is relatively abundant (approximately 500 times more prevalent than gold) occurring usually as an oxide or other chemical, rather than in its pure metallic form. It is the heaviest naturally occurring element and is found throughout the earth's crust, in rocks and soils, and in very low concentrations in stream sediments, rivers and oceans.

All elements are made up of a nucleus of positive protons and neutral neutrons surrounded by negative electrons to form an atom, in which the positive and negative charges usually cancel. The number of protons determines, through the number and arrangement of the matching electrons, the chemical properties of the element.

Additionally, most elements have versions of themselves that differ in the number of neutrons in their nuclei – so-called 'isotopes'. Uranium (92 protons), for example, has two main isotopes, with either 146 neutrons (referred to as 'U-238' accounting for >99% of all uranium nuclei) or 143 neutrons ('U-235' which constitutes only 0.7% of natural uranium).

In all elements, whilst the nuclei within the atoms are miniscule, the forces holding them together are colossal, so any significant change in the nuclear structure, such as a split, or fission, into two halves, is normally associated with a large energy release. Fission is not very common in nature, but for U-235, it can be induced by capturing neutrons in a reactor, and harnessed to drive steam turbines for electricity generation. This is the basis of nuclear power.

Lead is the heaviest element that has a stable nucleus, heavier nuclei being energetically unstable. Naturally occurring heavy elements such as Uranium release energy occasionally (in the form of different types of 'radiation'), transforming to a different nucleus in the process, as part of a path (a 'decay') towards a stable form.

One of the features of radioactive decay is that one cannot predict when any particular nucleus will decay and release energy. However, it is possible to predict the average time it will take for half of the isotopes in a group of one type of radioactive element to decay, a characteristic property called the 'half-life'. The more stable the element, the longer its half-life and, usually, the lower its radioactivity.

There are a number of elements between the two isotopes of uranium and the stable lead nuclei, so various step-wise decay paths (decay chains) connecting the two are possible, proceeding through isotopes of different heavy species. These decay chains are well known and predictable.

Hence, most uranium-bearing ore contains isotopes of heavy elements ranging from the initial uranium (the main component) down to lead. The intervening radioactive elements decay at different rates, contributing in a complex way to the overall radioactivity of the ore. When ore is initially processed to extract the uranium, fewer of these other heavy products remain in the purified material, although with time, they gradually grow back in.

Unfortunately, the energy release associated with radioactive decay can be injurious to human tissue, as it can ionise (or charge) atoms in the body itself, depending on the type of radioactivity:

- Alpha particles are highly ionising and relatively swift positively charged helium nuclei, but they cannot penetrate the outer layer of human skin. To be a health hazard, the alpha-emitter must be inside the body; hence the attention paid to ingestion.

- Beta particles are moderately penetrating negatively-charged electrons or positively charged positrons, that can travel a few millimetres in tissue, making the skin cells vulnerable;
- Gamma rays are not particles, but electromagnetic waves of high energy, which can pass through the body with fewer interactions with cells.

Unless otherwise specifically stated, the term 'radiation' in this document refers to one of the three types of 'ionising radiation' described above.

So why hasn't all the uranium in ore and its radioactive decay products in the Earth's crust decayed away? This is because the half-lives of uranium-238 and uranium-235 are staggeringly long at 4.5 billion years (ca. the age of the planet) and 700 million years respectively. Uranium's specific radioactivity is correspondingly low. Furthermore, half-lives are properties of the nuclei and are not affected by the chemical or physical environment, which explains why these half-lives apply to both the element in the laboratory and to naturally occurring uranium ore such as that found around Queensland.

The processing of uranium-bearing ore at a mine site sees the uranium atoms separated and delivered in a relatively physically and chemically stable oxide of uranium having a recognised chemical formula of U_3O_8 , colloquially known as 'yellowcake'. This substance is easy to transport as it has the consistency of fine sand and is not soluble in water.



Open cut uranium mine (ERA Ranger Mine)
Image courtesy of RioTinto

Typical transportable uranium oxide product
Image courtesy of Uranium Council

The produced uranium oxide is actually a complex mixture of uranium compounds containing the metal in different oxidation states: (IV) and (VI). Depending on the leaching, extraction, precipitation and drying methods employed by the mine, it may vary in colour from grey-black to yellow and in composition (containing diuranate $[U_2O_7]$ compounds, peroxide hydrates, basic uranyl sulphate, ammonium and other ions).

The color of the final uranium oxide product is highly dependent upon the temperature of the drying: At temperatures of less than $150^{\circ}C$, the product is the bright yellow color of

ammonium or magnesium diuranate, while at higher temperatures it changes color to the olive green of U_3O_8 , eventually forming black UO_2 . The final uranium oxide powder is purified off site for various other uses.

The risk of unacceptable exposure to radiation does not come solely from uranium, but from a series of isotopes of radioactive elements called radionuclides that are heavier than lead, so one should strictly talk about risks from all naturally occurring radioactive materials (or 'NORM', as they are called) rather than just uranium ore or its oxide alone.

Uranium resources overview¹

Uranium mines operate in some twenty countries, though in 2011 some 52 per cent of world production came from just ten mines in six countries.²

Australia's uranium has been mined since 1954, and four mines are currently operating. More are planned. Australia has the world's largest known supply of uranium estimated at 33 per cent of the world total and recoverable at reasonable cost. It is the world's third largest producer of uranium, behind Kazakhstan and Canada, supplying approximately 19 per cent of world demand. In 2011-12 Australia produced approximately 7700 tonnes and exported approximately 7000 tonnes of uranium oxide.

Resources

Australia has the world's largest resources of uranium with an estimated 1.158 million tonne in RAR³ recoverable at costs of less than US\$130 per kilogram. Based on the latest estimates for other countries, this represents approximately 33 per cent of world resources in this category. Other countries with large resources in RAR recoverable at costs of less than US\$130 per kilogram include Canada with 10 per cent, Kazakhstan with 10 per cent, Niger with 7 per cent and the United States with 6 per cent.

Queensland's total major uranium resources are currently estimated to be 100,000 tonnes (based on company statements that comply with standard financial reporting requirements). The proportion of Queensland's total major uranium resources that are recoverable at less than US\$130 a kilogram for example, are estimated to be approximately 40,000 tonnes (based on Nuclear Energy Agency/International Atomic Energy Agency standards). Queensland's uranium endowment is about 2 per cent of Australia's endowment.

Uranium estimates by Geoscience Australia in 2011 differ from the total figures currently presented by industry as it provides data based on the NEA/IAEA classification system and resource information known at the time of the report production. The estimated 40,000 tonnes (of uranium) is not categorised based on specific deposits and does not represent the current total resources in Queensland. The data only refers to estimated recoverable resources at less than US\$130 a kilogram at the time of writing.

¹ Geoscience Australia assesses and maps Australia's uranium resources and identified deposits. It publishes an annual detailed review of Australia's identified Mineral Resource, and the most recent edition can be found on their website. Geoscience Australia also publishes a detailed map of Australian Uranium resources which is reproduced at Figure 2.1 in this chapter.

² World Nuclear Association.

³ Geoscience Australia 2012. Australia's Identified Mineral Resources 2011. Geoscience Australia, Canberra.

Further, the NEA/IAEA system reports resources based on recoverable uranium (including costs) while accounting for losses resulting from mining and milling. This is not the standard used for company reporting resources in Australia with the standard uranium reporting using tonnes of uranium oxide as the standard for resource reporting.

The figures presented by industry and quoted in the report are based on current company statements on its resources, which have been issued in Australia or Canada depending on where the company is publicly listed. These statements comply with the Australian code for resource reporting (known as the Joint Ore Reserves Committee (JORC) Code); or the Standards of Disclosure for Mineral Projects (National Instrument (NI) 43-101 and applicable for the Toronto Stock Exchange, which is a JORC equivalent standard).

The JORC Code provides the minimum standards for public reporting on exploration results, mineral resources and ore reserves and has been incorporated in the Australian Stock Exchange listing rules. The Canadian National Instrument (NI 43-101) reflects a similar standard for resource reporting to the Toronto Stock Exchange. This is to ensure that investors and their advisers have all the information they would reasonably require for forming a reliable opinion on the results and estimates being reported.

The resource value of approximately \$10 billion referred to in this report is based on the current (January 2013) 100 000 tonne JORC or Canadian National Instrument (NI 43-101) compliant uranium oxide resources reported by companies given these are the standard method of reporting adopted in Australia and Canada. Some of these Queensland resources are known to have been upgraded since the publication of the GA 2011 report.

Production and mines

Australia is currently the world's third largest producer of uranium after Kazakhstan and Canada. Key Australian uranium export markets in 2011-12 were North America (39.5 per cent), Asia (40.2 per cent), and Europe (20.3 per cent). There are currently four operating uranium mines in Australia: Olympic Dam (BHP Billiton); Beverley (Heathgate Resources) and Honeymoon (Uranium One) all in South Australia; and Ranger (Energy Resources Australia) in the Northern Territory.

Geoscience Australia resource information

Geoscience Australia is a prescribed agency within the Australian Government's Resources, Energy and Tourism portfolio, providing geoscientific information, data and knowledge. One of Geoscience Australia's key activities focuses on enhancing mineral exploration and environmental land-use planning by producing geoscience maps, databases and information systems and by conducting regional geological and mineral systems research.

Geoscience Australia is responsible for mapping, modelling and monitoring changes to the Earth. Geoscience Australia produces a detailed map of Australian uranium resources (latest edition May 2010). This map has been reproduced in this report at Figure 2.1 and shows the location of uranium mineral deposits, their estimated tonnage, and geological regions.

The Committee encourages readers to make reference to a major report on Australia's energy resources which was released by the Federal Minister for Resources and Energy on

1 March 2010. The Australian Energy Resource Assessment examines the nation's identified and potential energy resources ranging from fossil fuels and uranium to renewables. The Australian Energy Resource Assessment was undertaken jointly by Geoscience Australia and the Australian Bureau of Agricultural and Resource Economics (ABARE), and a second edition is planned for release in June 2013.

The tables below are reproduced from information sourced from Geoscience Australia, the World Nuclear Association, and the Australian Government's Uranium Council on uranium resources, production and export.

Australia uranium production and exports

		2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12
Production	Tonnes Uranium Oxide	9533	10,964	9979	9581	10,095	10278	7150	7036	7701
Exports	Tonnes Uranium Oxide	9099	11,215	10,252	9518	10,151	10,114	7555	6950	6917
Exports	\$A million	364	475	545	658	887	1030	758	610	607

Production from individual mines (tonnes of uranium oxide)

	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12
Ranger	5312	4667	5544	5183	5256	5273	5678	4262	2677	3284
Olympic Dam	3075	3993	4356	3912	3474	4115	3974	2258	4012	3853
Beverley	762	873	1064	854	847	707	626	630	347	413
Honeymoon									0	151
Total	9149	9533	10,964	9949	9577	10,095	10,278	7150	7036	7701

Calendar year 2001 production of uranium oxide: 2641 t from Ranger, 3954 t from Olympic Dam, 416 t from Beverley, 45 t from Honeymoon, total 7056 tonnes (5983 tU).

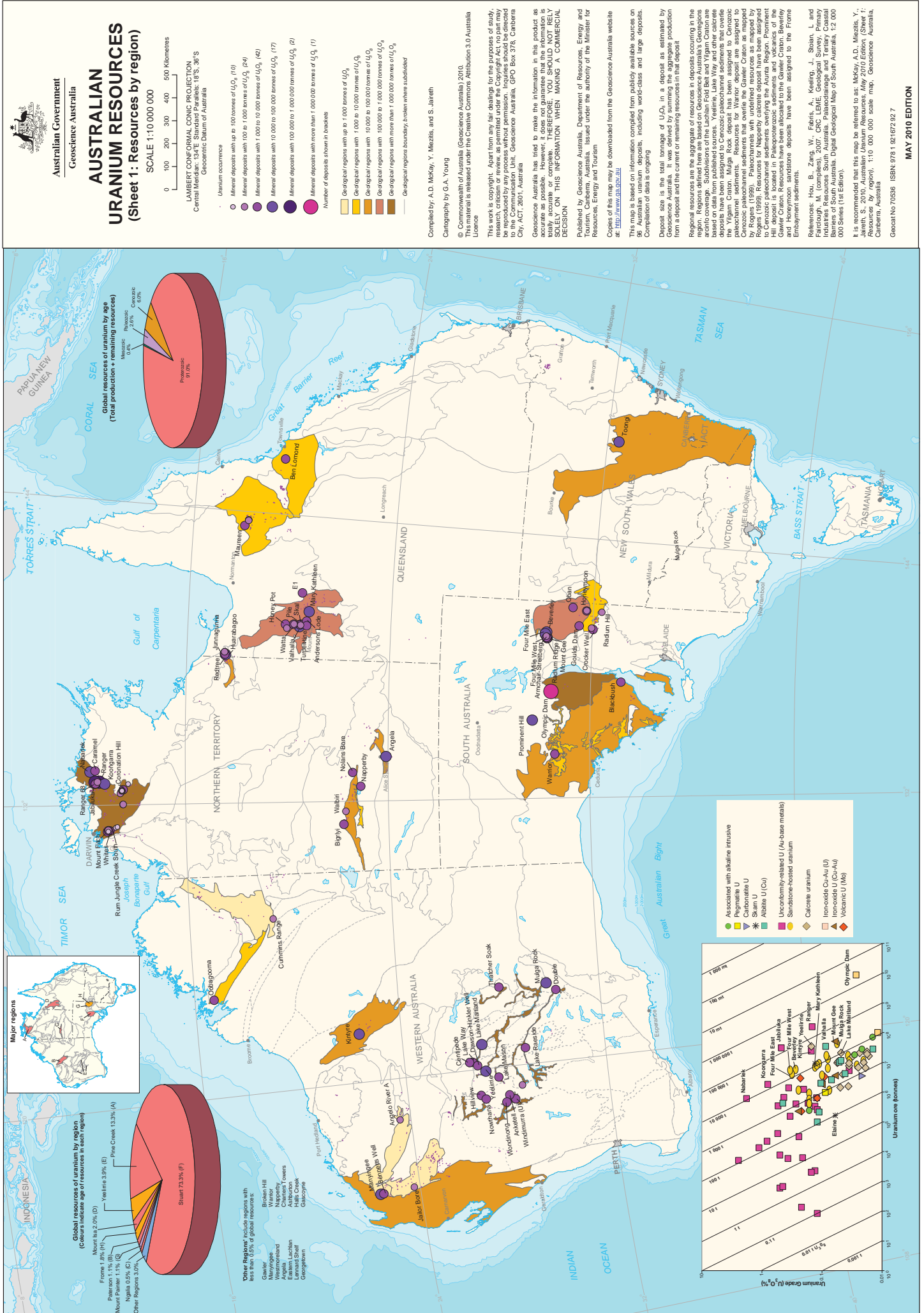
Source: World Nuclear Association

Production from countries

Country	Production (2011, t uranium)	World production (%)	World resource (%)	Production/resource ratio
Kazakhstan	19,451	35.6	12	2.97
Canada	9145	17.95	9	1.99
Australia	5983	10.95	33	0.35
Niger	4351	7.95	8	0.99
Namibia	3258	5.95	5	1.19
Russia	2993	5.5	9	0.61

Source: Uranium Council

Figure 2.1



History of uranium exploration and mining⁴

The existence of uranium deposits in Australia has been known since the 1890s. Some uranium ores were mined in the 1930s at Radium Hill and Mount Painter, South Australia, to recover minute amounts of radium for medical purposes. Some uranium was also recovered and used as a bright yellow pigment in glass and ceramics.

Exploration

Major exploration periods in Australia occurred in two distinct phases – from 1944 to the late 1950s and from the late 1960s onwards. The last major discoveries of uranium in Australia occurred in the 1980s. A minor exploration boom between 2002 and 2007 was driven by small companies focused on proving up known deposits.

Exploration during the first phase occurred at the request of the British and United States Governments and focused on discovering uranium for the purpose of defence programs. The second phase of exploration in Australia was driven by the use of uranium for power generation and the anticipated increase of nuclear power generators. As a result, other significant uranium discoveries were made, some of which continue to contribute to Australia's production landscape (for example, Olympic Dam). A summary of the major discoveries since 1944 is detailed in the following table.

Site	Location	Year of discovery
First phase – 1944 to late 1950s		
Rum Jungle	Northern Territory	1949
South Alligator Valley	Northern Territory	1953
Mary Kathleen	Queensland	1954
Westmoreland	Queensland	1956
Second phase – 1969 to present day		
Ranger	Northern Territory	1969
Jabiluka	Northern Territory	1971
Nabarlek	Northern Territory	1970
Olympic Dam	South Australia	1975
Beverley	South Australia	1969
Honeymoon	South Australia	1972
Yeelirrie	Western Australia	1972

(Source: Geosciences Australia 2001)

Former Australian uranium mines

The first phase of production in Australia is reported as 1954 to 1971 and resulted in supply contracts with the British and United States Governments. From 1971, Australian uranium has been exported to other nations for the purpose of power generation.

⁴ The World Nuclear Association (<http://www.world-nuclear.org/info/inf48.html>) provides a comprehensive account of the history of uranium mining in Australia.

Former Australian mines and production periods include:

- South Alligator Mines 1953-64
- Radium Hill 1954-62
- Rum Jungle 1954-71
- Mary Kathleen 1958-63, 1975-82
- Moline 1959-64
- Rockhole 1959-62
- Nabarlek 1979-88.

- **South Alligator Mines**

The first of the South Alligator mines in the Northern Territory was discovered in 1953. A concentrating plant began operation in 1956 at the El Sharana mine, which produced 150 tonnes of concentrate containing 70 tonnes of uranium in 1956-57. Also in 1957, the Coronation Hill uranium ore body was discovered. In 1958, construction of a small treatment plant began at Rockhole Creek. This plant was commissioned in 1959, closed in 1961 and then reopened in June 1962 for three months to produce uranium oxide. In 1959, the gold plant at Moline was converted for the extraction of uranium oxide. In 1963, uranium ore was treated at the Moline plant before closing in 1964 having completed its \$10 million contract to supply 520 tonnes of uranium oxide.

- **Radium Hill**

Ores were first obtained from an underground mine at Radium Hill in eastern South Australia in the 1930s to recover minute quantities of uranium for medical purposes. Then in 1954, the South Australian Government recommissioned the mine to deliver uranium oxide. This mine operated from 1954-61. The ore produced a concentrate containing 0.7 per cent uranium, which was railed 300 kilometres to a treatment plant at Port Pirie.

- **Rum Jungle**

The Rum Jungle uranium deposit was discovered in 1949 approximately 64 kilometres south of Darwin in the Northern Territory. In March 1952, the Australian Government provided funds to establish the mine and treatment plant to provide uranium oxide concentrate under a contract that ran from 1953-62, making this the largest industrial undertaking in the Northern Territory. A new township was built at Batchelor, eight kilometres south of the mine.

Production from the open cut mine began in 1953 and the treatment plant began in the following year. Another ore body was discovered at Rum Jungle Creek South and mining and stockpiling of high-grade ore took place between 1961 and 1963. Until 1962, the uranium treatment plant used an acid leach and ion exchange process. After this time, solvent extraction and magnesia precipitation was used.

By the time the mine closed in 1971, about 2000 tonnes of yellowcake had been stockpiled. As well as uranium, mineralisation at Rum Jungle included copper and lead. Some ore was treated to recover copper.

Pollution problems around the site occurred as a result of oxidation of sulphides by bacteria and the consequent release of acids and metals into the nearby East Finniss River was

coupled with the monsoonal climate and heavy rainfall. A comprehensive rehabilitation program began in 1983 and a supplementary program to improve Rum Jungle Creek South waste dumps was undertaken in 1990-91.

- **Mary Kathleen (Queensland)**

The Mary Kathleen uranium deposit, discovered in 1954, represents the only site in Queensland's history that has progressed to the mining and production stage. The former Mary Kathleen uranium mine is located in north west Queensland between Mount Isa and Cloncurry and was mined in two distinct periods.

Mining using open pit mining methods commenced at the end of 1956 while the process plant was commissioned in June 1958. The first phase of mine operation was from 1958-63 and the second from 1976-82. During the 12 years of operation, approximately 31 million tonnes of material was mined, including 7 million tonnes of ore. It was evident that the mineralisation (3.0 per cent rare earth oxides and 0.025 per cent thorium oxide) really comprised a rare earths ore body containing uranium, and over the years various attempts were made to find markets for the rare earths as a co-product, to no avail.

In the first phase of operation, Mary Kathleen treated 2.9 million tonnes of ore to yield 4082 tonnes of uranium concentrate. Initially the process involved a sequence of crushing, grinding, leaching with sulphuric acid, and decantation, followed by ion exchange and extraction. However, improvements in the treatment plant saw the introduction of electronic radiometric ore sorting in 1960. Tailings were placed in a 12 hectare tailings dam in a small valley west of the plant. When the mine was closed in 1963 approximately 2.8 million tonnes of ore was identified as remaining accessible by open pit mining.

For the first phase of operation at the Mary Kathleen mine, only one sales contract was negotiated with the United Kingdom Atomic Energy Authority in 1956. The contract for export at this time was for the purpose of supplying uranium for military programs undertaken by the United Kingdom and United States of America. Following this period, a drop in market prices for uranium oxide in 1963 resulted in the mine being placed into a care and maintenance period.

A transition in end use of uranium then occurred and resulted in a new market emerging for urban purposes. Due to the increased demand for uranium, mining recommenced in 1975 following the successful negotiation of new sales contracts with Japan, Germany and the United States of America for the purposes of power generation. The second phase of production concluded once the economic viability of extracting the resource had been exhausted. When the mine closed the second time in 1982 approximately 4802 tonnes of uranium oxide concentrate had been produced in this second phase.

Mary Kathleen became the site of Australia's first major rehabilitation project of a uranium mine. A full environmental impact study was undertaken in 1976, which included a rehabilitation plan for the 64 hectares of waste dumps, 29 hectares of tailings dam and 60 hectares of evaporation ponds. The rehabilitation project was completed in 1985 at a cost of \$19 million and in 1986 was acknowledged with an award for environmental excellence from the Institution of Engineers Australia. However, since the closure of Mary Kathleen, more

recent studies have established ongoing environmental legacy issues. These are discussed later in Chapter 5.

It is possible that Mary Kathleen could be redeveloped as a rare earth element mine with uranium as a byproduct (see Chapter 7). The photograph below shows an aerial view of the Mary Kathleen open-cut uranium mine during its second phase of operation in 1980.



Source: National Archives of Australia, Vrroom – Virtual Reading Room, vrroom.naa.gov.au.

- **Nabarlek**

A small, high-grade deposit was discovered at Nabarlek in 1970 inside Arnhem Land in the Northern Territory. After agreement was reached with the Northern Land Council, the deposit was developed in 1979 and continued until 1988. A total of 10,858 tonnes of uranium oxide was produced and \$14 million was paid in royalties to Indigenous communities.

Rehabilitation of the Nabarlek site was the first rehabilitation of a uranium mine according to current principles and practice and was completed in 1995. The plant was cleaned and decontaminated to stringent standards chemically and radiologically before parts were either sold or dismantled and buried in the mine pit with the tailings. A layer of waste rock was applied over the pit surface as an erosion-resistant cover. The whole mine site was successfully revegetated with a wide range of native species. Vegetation is now well established on the site.

Current uranium mines

There are currently four operating uranium mines in Australia – Olympic Dam (BHP Billiton), Beverley (Heathgate Resources) and Honeymoon (Uranium One) all in South Australia, and Ranger (Energy Resources Australia) in the Northern Territory.

- **Ranger**

Discovered in 1969 and located approximately 200 kilometres from Darwin, the Ranger deposit is situated in the Alligator Rivers uranium field (which includes other deposits such as Jabiluka and Nabarlek). Mining of the Ranger deposit initially commenced in 1981 with uranium ore being extracted through open cut methods. Below: A haul truck carries uranium ore out of the Ranger uranium mine, Northern Territory.



Source: (Reuters: Rio Tinto/David Hancock, file photo)

- **Olympic Dam**

Olympic Dam, owned by BHP Billiton, is the third largest uranium mine in the world and by far the largest single uranium resource in the world. The mine is located in arid country near Roxby Downs in northern South Australia. Olympic Dam is polymetallic, containing iron, copper, rare earth elements, silver and gold in addition to uranium. Mining at Olympic Dam is currently carried out by underground mining. The South Australian Government reports that 3885 tonnes of uranium oxide was produced at the site in 2011-12.

- **Beverley**

Beverley was discovered in 1969 and is located approximately 520 kilometres from Adelaide. It is a sandstone deposit with the mineralised zones between 100 metres and 130 metres in depth. Given the characteristics of the site, the resource is extracted in-situ and is Australia's first commercial operation to use such an approach.

In addition to the initial Beverley site, Heathgate (the resource proponent operating at the site) discovered further uranium deposits in 2009 at the area known as Beverley North. The South Australian Government reports that annual production in 2011-12 over the two sites was approximately 430 tonnes of uranium oxide. (Department for Manufacturing, Innovation, Trade, Resources and Energy (SA) 2012.)

- **Honeymoon**

The Honeymoon deposit is located in South Australia, approximately 75 kilometres from Broken Hill and was discovered in 1972. A major exploration program was undertaken until 1976 to delineate the resource. It was determined through a feasibility study in 1976 that it would be economically unviable to extract the uranium through open cut or underground mining methods (Geoscience Australia 2001). Uranium1, the current operator at the Honeymoon site, is pursuing in-situ recovery of the resource totalling 2900 tonnes of uranium oxide with an estimated annual production capacity of 400 tonnes. (Department for Manufacturing, Innovation, Trade, Resources and Energy (SA) 2012)

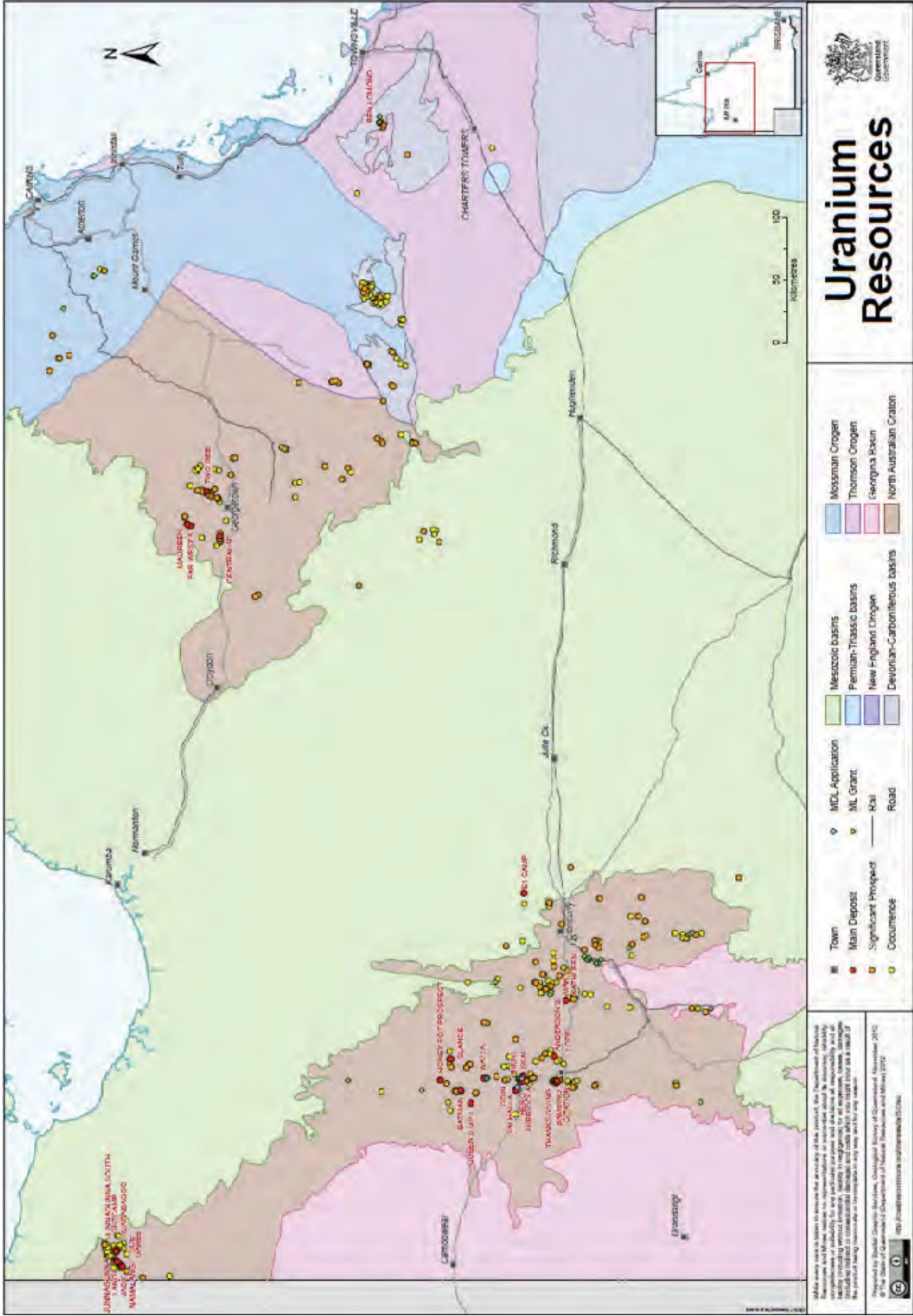
Queensland uranium deposits and projects

In Queensland, there are four main regions where uranium is known to occur, with varying deposit sizes. These four regions are the McArthur Basin (Westmoreland), the Mt Isa Province (Mount Isa to Cloncurry), the Gilberton Basin (near Georgetown) and the Charters Towers Province (west of Townsville, Ben Lomond).

Queensland has significant potential for uranium in deposits where it is either the sole commodity or is associated with other commodities. A total of 395 uranium occurrences have been recorded in the Queensland Government's (Geological Survey of Queensland) Mineral Occurrence Database, although most of these are very small and little more than radiometric or geochemical anomalies. It should be noted that some potential deposits are known (about 10 occurrences) but not verified and therefore are not identified in the database to date.

The map over page, produced by the Queensland Government, highlights geographically the major uranium resources in Queensland. The highlighted red areas indicate major resources determined and consistent with Australian standards (JORC).

Queensland uranium occurrences can be assigned to 13 major deposit models dominated by stratabound uranium-copper, followed by unconformity U-Au, shear zone-hosted hydrothermal, sandstone uranium, intrusive uranium, iron-oxide–Cu–Au, hydrothermal vein types and minor deposit types. The diversity of deposit models suggests that Queensland has a strong uranium endowment and mineralisation manifested through different styles.



Recommendation of uranium mining - a best practice framework.

There are a number of resources companies interested in uranium development in Queensland. Information from 2010 provided to the Committee by the Australian Uranium Association and advice provided by the Geological Survey of Queensland show current major uranium projects and activities in Queensland, and indications of potential future works⁵.

Several uranium projects in Queensland have already undertaken extensive exploration, have long-term employees and have already built strong relationships with the local communities.

- **Westmoreland (McArthur Basin Subprovince) – Laramide Resources**

The Westmoreland Uranium Deposits were discovered in 1956 and are located in far north west Queensland, on the Northern Territory border, some 400 kilometres from Mt Isa. This places the project north of the Century Mine and Doomadgee township to the west of Hells Gate Roadhouse. The deposits contain in excess of 51.9 million pounds (23.5 million kilograms) of uranium oxide and are subject to ongoing exploration expenditure of \$45 million since 2006.

Exploration has delineated several significant centres of mineralisation, including the Redtree deposits, Huarabagoo and Junnagunna. Rio Tinto Exploration Pty Ltd acquired the Westmoreland project area in 1997 but has since relinquished all tenure over the deposits, and tenure has now been acquired by Canadian company, Laramide Resources Ltd.

A scoping study considered the project to be economically robust, based on production of around 3 million pounds (1.4 million kilograms) of uranium oxide annually from an open-cut mine with production costs around US\$20 per pound, and an estimated initial mine life of 11 years. The company is updating the scoping study following the results of positive metallurgical test work. The scoping study also estimated an approved mine would employ around 750 people during construction and 300 people during operation. Capital cost would exceed \$300 million. Employees would be drawn from the local area which hosts a skilled workforce because of the Century Mine.

The deposits are amenable to open-cut mining with low stripping ratios and excellent metallurgy. Export is forecast to occur via Darwin. Laramide has a cooperative relationship with the Gangalidda-Garawa Claim Group. The project would likely provide training, jobs and benefits in an area of Queensland which offers few on country employment opportunities.

⁵ Geological Survey Queensland advise that data relating to geology and mineral deposits was sourced from company and government reports that are publicly available through their respective websites or the ASX (Australian Stock Exchange) within the public domain. Additional information was also supplied to the Committee in the Australian Uranium Association's submission.



Any proposed mining and processing is likely to occur within the Preservation Area of the Lagoon Creek Wild River. Environmental baseline studies have been a key aspect of Laramide's exploration program, with well recognised consultants supported by Indigenous rangers conducting terrestrial and aquatic flora and fauna studies in conjunction with surface and sub-surface water studies. To date, some \$3.5 million has been spent on these ongoing studies.

Exploration continues in this area with Laramide commencing additional activities in 2012. This includes an initial program of 4000 metres for 25 drill holes to focus on the corridor connecting the Huarabugoo and Junnagunna deposits.

- **Valhalla (Mount Isa Province) Paladin Energy Ltd and Summit Resources Ltd**

The Valhalla deposit, 40 kilometres north-north-west of Mount Isa was discovered in 1954. It is the largest of a number of shear-related uranium occurrences hosted by the Eastern Creek Volcanics in the Western Fold Belt Province. Summit Resources (Australia) Pty Ltd obtained ownership of the prospect in 1992. The other uranium deposits delineated are the Odin, Bikini and Skal deposits, which could provide additional feed to a future milling and processing operation at Valhalla.

The prospects are currently held by a joint venture between Summit Resources and Paladin Energy Ltd, although Summit Resources retains 100 per cent ownership of the nearby Anderson's Lode, Bikini, Mirriola and Watta deposits. Summit and Paladin have completed further drilling and reported total resources in the Valhalla area deposits of over 60,000 tonnes (60 million kilograms) of uranium oxide. There is potential to significantly increase these resources, as both deposits remain open along strike and at

depth. Additional resources are known at Duke Batman and Honey Pot Prospect, which were acquired from Fusion Resources Ltd by Paladin Energy Ltd in 2009.

In excess of \$43 million has been spent on exploration and operations since 2008. The project is of significant scale, evident from the amount of 'in-ground' metal. Current and future work entails exploration to further expand and define the resources in the region, continuing environmental baseline work, mineralogical studies, geotechnical evaluation and metallurgical test work as a precursor to the preparation of feasibility studies.



- **Mount Isa - Deep Yellow (Mount Isa Province)**

Seven other deposits in the Mount Isa district which are 100 per cent owned by Deep Yellow Ltd have inferred and indicated resources, currently reported at just over 2000 tonnes (2 million kilograms) of uranium oxide. Deep Yellow Ltd acquired these deposits from Superior Resources Ltd in 2007 and has since carried out exploration and resource estimation, however it is currently divesting its Australian assets.

- **Ben Lomond (Burdekin Basin Province) Mega Uranium Ltd**

The Ben Lomond deposit area is located approximately 60 kilometres from Townsville, and the current estimated resource size is just over 4000 tonnes (4 million kilograms) of uranium oxide. Ben Lomond is now one of Australia's highest grade undeveloped uranium properties.

The French company Pechiney discovered Ben Lomond in 1975. Total Mining Pty Ltd and Minatome Australia Pty Ltd explored and evaluated the deposit in detail between 1976 and 1982. The proposal to mine Ben Lomond reached advanced project stages with mining leases granted in 1980 and 1983. A draft environmental impact statement was released to the public in 1983 and finalised in 1984 following consultation processes.

Uranium mining did not proceed at the site because it was impacted by the introduction of the 'three mines policy' in 1983. Following the introduction of this policy, the site was contained, fenced securely and placed under care and maintenance with regular environmental monitoring.



While there have been restrictions on uranium mining, mining leases have continued to be held over the area. The prospect was acquired from the private company Uranium Mineral Ventures Inc. by Canadian company Mega Uranium Ltd in 2005 and is being reassessed. While there has been no drilling at Ben Lomond since 1987, Mega Uranium Ltd has completed prefeasibility studies and modest exploration programs that have indicated considerable potential to expand the resources within the mining leases. As of December 2012, Mega Uranium Ltd is considering further drilling to expand the resources at Ben Lomond to make the project feasible. (Refer to the case study in Chapter 4 on Ben Lomond.)

- **Maureen (Gilberton Basin) Mega Uranium Ltd**

The smaller Maureen uranium deposit, 35 kilometres north-north-west of Georgetown in north Queensland, was discovered by Central Coast Exploration NL in 1971. The primary uranium mineral is uraninite, which is associated with molybdenum and fluorite. The deposit could be mined by open-cut methods. The deposits are being explored by Mega Uranium Ltd, which acquired the project from Georgetown Mining Ltd in 2005. Some 30 kilometres south and south-east of Maureen, four other smaller uranium

deposits (Central 50, Far West 5 and 7 and Two Gee) contain historical inferred resources. The total estimated resource for the Maureen deposit areas is almost 4500 tonnes (4.5 million kilograms) uranium oxide.

- **Mount Margaret – E1 Camp (Mount Isa Province) Xstrata Copper**

This site has iron-oxide-copper-gold deposits, which potentially contain uranium, like the Olympic Dam deposit in South Australia. However, although such deposits occur in north west Queensland (for example Ernest Henry, Starra and Mount Elliot), resources have only been published to date for the E1 and Monakoff deposits near Cloncurry, which comprise the Mount Margaret Project.

Open-cut mining commenced at Mount Margaret in 2012, with the ore being processed at Xstrata's nearby Ernest Henry mine, but there are currently no plans to recover uranium. Over a five-year mine life, Mount Margaret is expected to produce about 140,000 tonnes of copper, 83,000 ounces of gold and 560,000 tonnes of magnetite concentrate.

Deposits with no known JORC-compliant resources

Much of Queensland remains underexplored or unexplored for uranium. Recent exploration has highlighted other deposits for which there are no JORC-compliant resources known at the moment. These deposits are detailed below.

- **Elaine Dorothy (Mount Isa Province) Chinalco Yunnan**

In 2012, a Chinalco Yunnan Copper Resources Limited and Goldsearch joint venture discovered a multi-element mineralised system at the Elaine prospect located six kilometres south of Mary Kathleen. It contains variable and relatively high grades over significant widths of copper, cobalt, gold, rare earths and uranium. Uranium, thorium and light rare earths occur together and separately from the copper mineralisation.

- **Ernest Henry (Mount Isa Province) Xstrata**

Production at the Ernest Henry copper-gold mine, located 37 kilometres north-east of Cloncurry commenced in 1998. The operation was transitioned from an open-cut to an underground mine in late 2011. Magnetite is liberated during the copper-gold concentrating process and was traditionally discarded as tailings, but is now recovered with the ability to reprocess. Uranium mineralisation is potentially present in the magnetite from this deposit.

- **Milo IOCG-REE (Mount Isa Province) GMB Resources**

GBM Resources Limited owns the Milo Project in the Cloncurry district, which has just reached pre-feasibility stage. The Milo deposit is understood to be a hybrid multi-commodity iron-oxide-copper-gold (IOCG) resource containing copper, gold, molybdenum and uranium that has been overprinted and enveloped by widespread value adding rare earth elements (REE) and yttrium.

- **Phosphate Hill (Georgina Basin) Incitec Pivot Ltd**

Phosphate rock is mined only at large open-cut mines at Phosphate Hill, 135 kilometres south-south-east of Mount Isa by Incitec Pivot Limited, Australia's biggest fertiliser manufacturer and supplier. The operation is Queensland's most significant industrial mineral operation in terms of production value. A significant phosphate deposit is also located at Ardmore, 70 kilometres west of Phosphate Hill. Ammonium phosphate fertiliser products from Phosphate Hill are railed 900 kilometres east to the Port of Townsville.

High background levels of uranium are associated with phosphate deposits in the Georgina Basin (along with rare earths), and recovery of uranium during the production of fertilisers is technically possible even if not currently economically feasible.

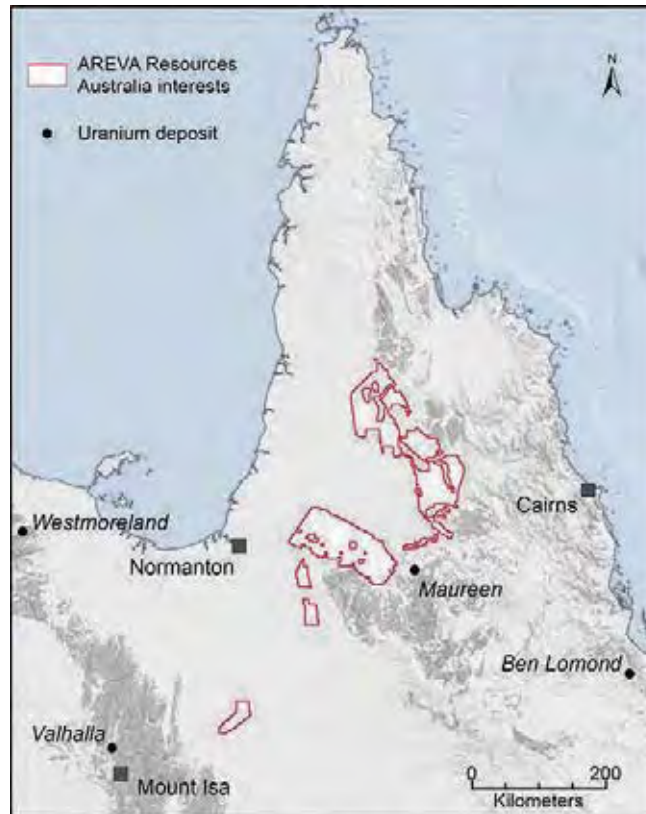
- **Julia Creek (oil shale–vanadium–molybdenum) (Eromanga Basin) Interim Resources Ltd and Xstract Energy**

This project, held by Intermin Resources Limited, covers a large area in the vicinity of Julia Creek, where extensive oil shale deposits exist near the surface with both the oxidised and fresh oil shale horizons containing significant molybdenum and vanadium. The company has completed its test work and assessment to the scoping study and engineering design stage. The Toolebuc Formation is also known to be anomalous in uranium, but the company has to date not done any test work for uranium.

Xstract Energy PLC, under an agreement with Intermin, held the oil shale rights for some of the Intermin tenements. These rights have recently been acquired by Global Oil Shale Group Limited and the company has announced that it will carry out a detailed work program.

- **AREVA Resources Australia**

AREVA is currently exploring a package of more than 120 permits covering in excess of 44,000 square kilometres. Queensland is host to the largest portion of AREVA's portfolio, with a land holding of more than 20,000 square kilometres in the Gulf Region. AREVA is targeting sediment hosted uranium deposits within the Karumba and Carpentaria Basins, which have not been explored for uranium for more than 30 years.



AREVA has recently been granted 47 exploration permits with an additional 27 in application. The company plans to commence diamond drilling as soon as all statutory approvals are in place. AREVA already has agreements in place with Native Title claimants for consultation and cultural heritage protection. Estimated exploration expenditure during the next five years will be approximately \$15-20 million, depending upon exploration success.

2.2.3 Science and nature of uranium mining⁶

The nature of uranium

Uranium is an abundant natural heavy metal distributed throughout the Earth's crust. In its pure form, uranium is a silvery white metal of very high density, 1.7 times more dense than lead. Uranium is found as an oxide or complex salt in minerals such as pitchblende, uraninite and brannerite. Concentrations of uranium also occur in substances such as phosphate rock deposits and minerals such as lignite.

Uranium is 500 times more abundant in the Earth's crust than gold, and as common as tin. While uranium can be found almost everywhere, including in seawater, concentrated uranium ores are found in relatively few places, usually in hard rock or sandstone. Traces of uranium can also be found in food and in the human body. Concentrations of uranium that are economic to mine for use as nuclear fuel are considered ore bodies.

⁶ General sources include: World Nuclear Association, the Australian Nuclear Science and Technology Organisation (ANSTO), the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) and the International Atomic Energy Agency (IAEA).

Economically extractable concentrations of uranium occur in more than a dozen different deposit types in a wide range of geological settings.

Uranium extraction and the energy production cycle

The overall objective of uranium extraction chemistry is the preparation of U_3O_8 , ('yellow cake' or more generally referred to in this report as uranium oxide). Extraction of uranium is often complex and the metallurgical procedures vary with the geological environment of the ore.

Following mining and milling, uranium metal (U) is sold as UOC which is comprised of U_3O_8 and small quantities of impurities. Following mining and milling, the uranium product enters the remaining stages of the nuclear fuel cycle, forming the feedstock for the conversion and enrichment process⁷.

The diagram over page illustrates the complete lifecycle, including the re-processing of spent nuclear fuel. Note that it is currently prohibited in Australia to participate in any activities of this nuclear fuel cycle beyond the uranium mining/milling stage.

The uranium oxide product of a uranium mill is not directly usable as a fuel for a nuclear reactor and additional processing is required. Only 0.7 per cent of natural uranium is 'fissile', or capable of undergoing fission, the process by which energy is produced in a nuclear reactor.

Naturally occurring uranium exists as a mix of three isotopes in the following proportions: U-234 (0.01 per cent), U-235 (0.71 per cent) and U-238 (99.28 per cent). Uranium-235 has a unique property in that it is the only naturally occurring fissile isotope. That is, the nucleus of the U-235 atom is capable of splitting into two parts when hit by a slow neutron.

Inside a nuclear reactor the nuclei of U-235 atoms split (fission) and, in the process, release energy. This energy is used to heat water and turn it into steam. The steam is used to drive a turbine connected to a generator which produces electricity. Some of the U-238 in the fuel is turned into plutonium in the reactor core.

The main plutonium isotope is also fissile and this yields about one third of the energy in a typical nuclear reactor. The fissioning of uranium (and the plutonium generated in-situ) is used as a source of heat in a nuclear power station in the same way that the burning of coal, gas or oil is used as a source of heat in a fossil fuel power plant.

⁷ Refer to the World Nuclear Association website for a complete description of the nuclear fuel cycle at: <http://www.world-nuclear.org/info/inf03.html>.

Nuclear fuel cycle and materials (Source: IAEA)



Uranium is extremely energy efficient, as illustrated by the table below. Typically, some 44 million kilowatt-hours of electricity are produced from one tonne of natural uranium.

Energy conversion: Typical heat values of various fuels

	Megajoule (MJ)
Firewood (dry)	16 MJ/kg
Brown coal (lignite)	10 MJ/kg
Black coal (low quality)	13-23 MJ/kg
Black coal (hard)	24-30 MJ/kg
Natural Gas	38 MJ/m ³
Crude Oil	45-46 MJ/kg
Uranium – in typical reactor	500,000 MJ/kg (of natural U)

Source: *Uranium Facts: Radiation*, Department of Resources, Energy and Tourism, accessed at http://www.ret.gov.au/resources/mining/australian_mineral_commodities/uranium/council/Pages/council.aspx

Uranium demand and supply are generally expressed in terms of tonnes U, while uranium mine production, ore reserves, ore grades and prices are commonly described in terms of U₃O₈. Uranium prices are generally expressed in terms of US dollars per pound.

Uses for uranium

Uranium has two major peaceful purposes: as the fuel in nuclear power reactors to generate electricity, and for the manufacture of radioisotopes for medical and other applications.

As at 1 April 2011, there were 440 commercial nuclear power reactors operating in 30 countries, most of which are light water type reactors. The total installed nuclear generating capacity is 375,410 megawatts which provides about 13.8 per cent of the world's electricity generation.

Besides fuelling electricity generation, uranium has numerous other uses. Uranium and other radionuclides are used by nuclear medicine (MRIs, X-rays, radioisotope injections, radiation treatment, etc.), scientific research (age-dating materials, compositional information, metabolic studies, etc.), agriculture (irradiating food and seeds), consumer products (smoke detectors, watches, irradiating bandages and other items to sterilise them, computer components, etc.), materials testing for numerous industries (automotive, aircraft, construction, mining and oil) and space exploration (fuels).

Radioisotopes are an essential part of radiopharmaceuticals. Some hospitals have their own cyclotrons, which are generally used to make radiopharmaceuticals with short half-lives of seconds or minutes.

In addition, depleted uranium has been used for counterweights in sail boat keels, ballast in boats, pigments and radiation shielding. Uranium is also used as fuel for smaller reactors to power submarines, ice-breakers and aircraft carriers.

Research

In addition to electricity and medical use, uranium is also used to fuel research reactors for a range of scientific, medical and industrial organisations to conduct specialised nuclear research, as well as to produce radioisotopes. Australia has one nuclear scientific research reactor (OPAL) at Lucas Heights in Sydney that produces, among other things, isotopes for use in nuclear medicine.

The Australian Nuclear Science and Technology Organisation (ANSTO) operates the OPAL reactor, which is a 20 megawatt plant producing neutrons and low thermal energy. By contrast, a nuclear power plant for electricity generation can be of the order of 800MW or more, and produces high thermal energy.

The uranium mining process

Uranium exploration

Uranium deposits are not distributed at random in the Earth's crust. They are geologically controlled. There are different ways companies explore for uranium. These include:

- **Geological mapping**

Good geological maps are essential for the selection of favourable areas for investigation. They are equally important for the proper interpretation of other exploration surveys, radiometric, geochemical etc. Both state geological surveys and the national geological survey (Geoscience Australia) are involved in making geological maps available to interested parties.

- **Remote sensing**

Remote sensing refers to the use of images remotely recorded or measured. These include aerial photographs, Landsat images, Side Looking Airborne Radar (SLAR) images, and other multi-spectral scanning images. These techniques are used extensively to provide additional geological and uranium favourability information on a regional scale. Features of importance are often visible on satellite images that cannot be seen on normal aerial photographs.

- **Radiometric methods**

Radiometric methods are convenient to operate. Both airborne and carborne total count and gamma ray spectrometer surveys have played a large part in uranium exploration, permitting the coverage of large areas rapidly and conveniently at the reconnaissance and follow-up phases. At the detailed phase, grid surveys using total count instruments as well as gamma ray spectrometers are widely used. Radiometric bore hole logging methods come into play during the drilling stage and often permit the calculation of ore reserve estimates.

- **Geochemical methods**

These methods entail the collection of samples of materials from the surface environment, water, lake or stream sediment, soil, rock or gas, and the analysis of these for one or a number of elements. In uranium exploration they have proved particularly valuable at the reconnaissance phase, often providing geological as well as uranium favourability data. In most cases, the possibility of multi-element analyses makes collection of geochemical samples cost effective, although such surveys are slower and more time consuming than airborne surveys.

- **Other geophysical methods**

Magnetic surveys are frequently used for mapping potential ore bearing structures, particularly in granitic environments.

Uranium mining and processing

Uranium ore is generally recovered through conventional mining methods such as surface or underground mining, and in some instances through in-situ recovery. Uranium deposits close to the surface can be recovered using the open pit mining method, and underground mining methods are used for deep deposits. Mining by in-situ recovery is a process that dissolves the uranium while still underground, and then pumps a uranium-bearing solution to the surface.

- **Open pit mining**

Where a uranium ore body is close to the surface open pit mining methods will generally be used to mine the ore body. Horizontal slices or benches are progressively extracted from the surface downwards initially through the overburden and then through the ore body and waste rock.

The benches are drilled and blasted and then loaded into large rear dump trucks using either hydraulic or electric shovels or diesel loaders. The rear dump trucks transport the broken material on the haul roads constructed in the benched pitwall to the process plant or waste dump depending on whether the material is ore or waste respectively.

The Ranger Uranium Mine in the Northern Territory is an open pit mining operation.

- **Underground uranium mining**

If the uranium ore body is too far below the surface for the overburden and waste rock to be economically removed then, depending on the grade of the ore body, underground mining methods may be used with tunnels and shafts excavated to access the uranium ore body.

The ore body will then be extracted using hard rock mining methods such as blast hole stoping. The broken ore is extracted from the bottom of the stopes using front end loaders and either loaded into rear dump trucks for transport to the surface process plant. Alternatively it may be transported to underground crushing and ore hoisting facilities from where it is hoisted to the surface and then transported to the process plant.

Typically the voids left underground by the extraction of the stopes are backfilled either with waste rock or a cemented aggregate comprising deslimed tailings, a cementing agent and crushed waste rock.

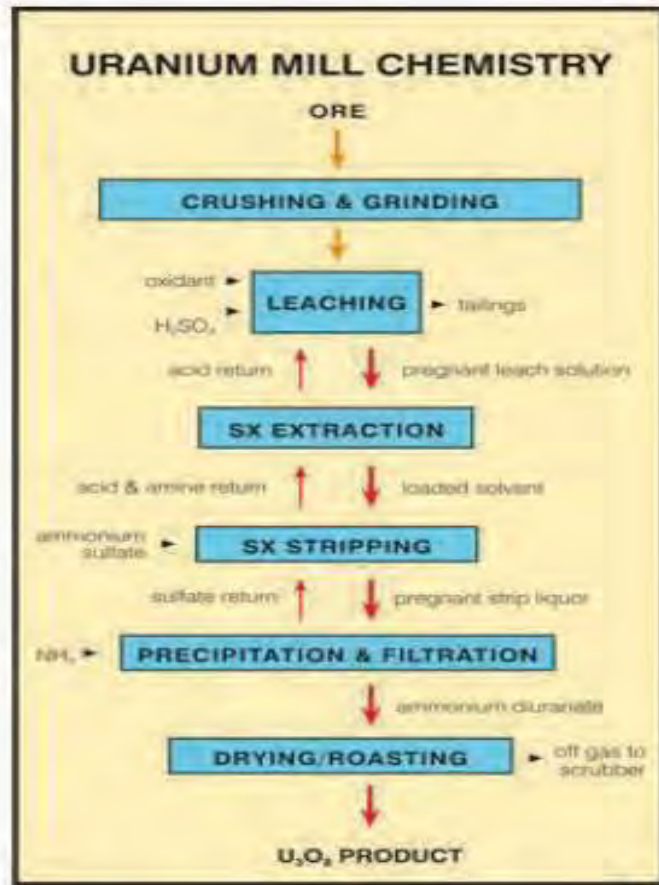
The Olympic Dam Mine is an underground mining operation.

Ore processing

After mining, ore is transported to a nearby mill for processing. The first step in milling is to crush the ore, unless it is in a solution already, and treat it with acid to separate the uranium metal from unwanted rock material. Then it is purified with chemicals to selectively leach out (dissolve) the uranium.

The uranium-rich solution is then chemically separated from the remaining solids and precipitated (condensed) out of the solution. Finally, the uranium is dried and the resulting powder product is packaged into special steel drums similar in size to oil barrels. When full they weigh about 400 kilograms.

Summary of uranium extraction and processing to uranium oxide



Source: World Nuclear Organisation

- **Heap leaching**

Heap leaching is an extraction process by which chemicals (usually sulphuric acid) are used to extract the economic element from ore that has been mined and placed in piles on the surface. Heap leaching is generally only economically feasible for oxide ore deposits. Oxidation of sulphide deposits occur during the geological process called weatherisation. Therefore oxide ore deposits are typically found close to the surface.

Heap leaching is significantly cheaper than traditional milling processes. The low costs allow for lower grade ore to be economically feasible (given that it is the right type of ore body). Environmental law requires that the surrounding ground water is continually monitored for possible contamination. The mine will also have continued monitoring even after the shutdown of the mine.

- **In-situ recovery**

In-situ recovery (ISR) involves leaving the ore where it is in the ground, and recovering the minerals from it by dissolving them and pumping the 'pregnant solution' to the surface where the minerals can be recovered. Consequently, there is little surface

disturbance and no tailings or waste rock generated. However, the ore body needs to be permeable to the liquids used, and located so that they do not contaminate ground water away from the ore body.

Uranium ISR uses the native groundwater in the ore body which is fortified with a complexing agent and in most cases an oxidant. It is then pumped via injection wells through the underground ore body to recover the minerals in it by leaching. Once the pregnant solution is returned to the surface, the uranium is recovered in much the same way as in any other uranium process plant.

Uranium ISR uses either acid or alkaline solutions to extract the uranium directly from the deposit. It involves passing sulphuric acid with an oxidising agent (often hydrogen peroxide) to mobilise and stabilise the uranium in solution, through a porous uranium ore body and bringing the pregnant liquor to the surface and the process plant.

However, the low cost of ISR is balanced by the very specific and limited requirements of the ore body (a porous uranium-bearing ore body with a redox front encapsulated by an impervious mineral layer, often a shallow sandstone aquifer, confined by shale or mudstone). This method of mining lends itself to small ore bodies that owing to their relatively low grade and great depth would be uneconomic to mine using conventional methods.

ISR is currently used at the Beverley and Honeymoon mines in South Australia. While the ISR method is unlikely to be suitable for Queensland's existing known and advanced projects, future discoveries within sandstone-type deposits, for example some areas of the Carpentaria and Karumba Basins, may be more suitable for ISR. Historically, uranium production has principally involved open pit and underground mining. However, over the past two decades IRL mining has become increasingly important.

2.3 The uranium market and industry performance ⁸

The uranium market, like all commodity markets, has a history of volatility, moving not only with the standard forces of supply and demand, but also to whims of geopolitics. It has also evolved particularities of its own in response to the unique nature and use of this material.

Projecting future demand for uranium to be used in nuclear power generation is complicated by uncertainty in evolving global electrical power generation preferences. Greenhouse gases, climate change awareness, and waste disposal issues are

⁸ The information presented in this section is sourced from various materials – domestic and international governmental and expert bodies, as well as the views from certain industry analysts. For a comprehensive account of global uranium resources, production and demand, the Committee suggest referring to the following source: The International Atomic Energy Association (IAEA) works together with the OECD Nuclear Energy Agency (NEA) to collect and provide information on uranium resources, production and demand. The cooperation results in a publication entitled **Uranium - Resources, Production and Demand**, commonly known as the 'Red Book'. It has been published since mid-1960s and is now being published at two-year intervals. The Red Book 2011 is the 24th edition of this periodic assessment and provides analyses and information from 42 countries. http://www.oecd-ilibrary.org/nuclear-energy/uranium-2011_uranium-2011-en.

generating much discussion about fuel sources. Uranium resources and prices have reflected the changing environment in relation to historical nuclear power generation.

However, the Committee agrees that in regards to the uranium market, there will be a continuing need for exploration, mining, and processing of uranium for many years to come, and that sustainability of the industry is an appropriate consideration. A currently subdued market for uranium is not expected to greatly impact on potential Queensland uranium exports given the significant lead times associated with commencing mining operations.

Prices and market

While producers sell most of their uranium output on the basis of long-term contracts, the spot price of uranium is published by independent market consultants and like most other commodities responds to and reflects forces of supply and demand in the marketplace. Periodically negotiated contract prices tend to be lower than spot prices, but are less volatile.

The uranium market has been on a long unstable recovery since the 2008 Global Financial Crisis (GFC) impacted the commodities sector generally. Prices for uranium have been volatile due to a range of factors including the GFC and changes in the value of the US dollar. Throughout the second half of 2010 the uranium spot price recovered and reached a pre-crash high of \$72 a pound in January 2011. However, the industry fallout following the Fukushima Daiichi nuclear disaster in March of that year saw spot prices fall back to between \$49 a pound and \$52 a pound, for nearly a year, and uncertainty was the dominant factor affecting prices in 2012.

Softer market conditions are likely for some time with uranium businesses addressing cost issues, spreading capital investment over a longer period and focussing on brownfields projects. Industry commentators⁹ suggest it will take spot prices of \$70 a pound to \$80 a pound for some large projects to become economically viable.

In 2013, the Bureau of Resource and Energy Economics (BREE) forecasts the uranium price to increase to around US\$56 a pound, supported by higher demand from the start up of several new nuclear reactors and opportunistic buying activity before the end of the US-Russian Federation Highly Enriched Uranium (HEU) purchase agreement this year¹⁰. High profile expansion and production deferrals coupled with the end of the HEU agreement have the potential to create a significantly tight market in the medium term,

⁹ *Uranium Investing News*

¹⁰ *Agreement Between the Government of the United States and the Government of the Russian Federation Concerning the Disposition of Highly Enriched Uranium Extracted from Nuclear Weapons* ("HEU Agreement") was signed on February 18, 1993. The HEU agreement provides for the United States to purchase from the Russian Federation 500 metric tons of highly enriched uranium (HEU) converted to commercial grade, low enriched uranium over twenty years (1993-2013). The HEU is blended down to commercial grade, low-enriched uranium. The low-enriched uranium resulting from the HEU Agreement represents the equivalent of almost 400 million pounds of natural uranium, enough to satisfy about nine years of demand for uranium in the United States. The HEU agreement ends in 2013 and could place increased pressure on identifying new supply sources.

which is expected to lead to an improvement in spot prices as early as the second half of 2013.

Some analysts estimate a stronger outlook with an average price above US\$60 a pound in 2013, peaking at over US\$70 a pound in 2014-15 before stabilising at approximately US\$70 in the long-term¹¹. Other predictions include UBS (NYSE:UBS) looking for prices to return to \$50 a pound in 2013 and \$55 a pound in 2014, while Credit Suisse (NYSE:CS) has issued a much more positive outlook, indicating that uranium should trade in a range of \$80 a pound to \$90 a pound for 2013. JP Morgan also has a positive outlook and anticipates a range of \$78 a pound to \$85 a pound.

The key challenge in assessing future demand is anticipating the policy decisions on nuclear power by international governments. In particular, the decisions by the Japanese Government on the restart of its remaining 48 nuclear reactors represent a particular risk in forecasting demand (two reactors were restarted in 2012).

Demand

The fundamental drivers of demand for Australian uranium remain unchanged, and uranium companies continue to develop new projects and expand existing ones. The stronger medium to long-term price for uranium is based on solid fundamentals with 2012 prices reflecting a projected bottom in price. Uranium demand is growing throughout the world. The World Nuclear Association reported global demand in 2012 as 80,181 tonnes uranium oxide¹² and this is forecast to increase to 82,400 tonnes in 2013 and to 110,000 tonnes by 2017¹³.

This is largely based on nuclear power expansion projects expanding in nations around the world, including China, India, Russia, Ukraine, the US, the UK, South Korea and the United Arab Emirates. The World Nuclear Association reports that at 1 January 2013 there were 435 nuclear power reactors; 65 currently under construction; 176 on order or planned; and 317 proposed.¹⁴

This shortfall is predicted to be offset in the long-term by increased demand from Asia, where the majority of new nuclear reactors are under construction. Australia is well-placed geographically to provide for this region. The Bureau of Resource and Energy Economics (BREE) forecasts uranium demand to continue to increase at a rate of seven per cent a year between 2013 and 2017, in response to new reactors scheduled to begin operation between 2012 and 2017.

Supply and production

In 2013, world uranium mine production is forecast to increase by a further six per cent, to 61,500 tonnes. Australia's uranium production is expected to decline in 2013 due to the final closure of Pit 3 at the Ranger mine in the Northern Territory. This is expected to

¹¹ *The energy report*

¹² <http://www.world-nuclear.org/info/reactors.html> (BREE projects 74,600t)

¹³ <http://bree.gov.au/documents/publications/req/REQ-Mar-2012.pdf>

¹⁴ World Nuclear Association, at: <http://www.world-nuclear.org/info/reactors.html>

be more than offset by continued production growth in Kazakhstan and higher production from existing mines in Canada and Africa.

The IAEA reports that the current identified resource base generally represents an adequate supply base to meet the long-term demand scenarios by 2035. It notes that in 2010, 85 per cent of world reactor requirements were met by extraction with the remainder coming from 'secondary sources', such as the HEU Agreement mentioned above.

2.4 Key elements of a best practice policy framework

Best practice principles

The Committee supports adoption of world best practice in Queensland as a means to enable uranium mining and processing in line with acceptably high standards, and provide a firm basis for a successful and sustainable uranium mining industry. Best practices, by nature, are not static but continuously evolve in response to new technology, increased understanding and awareness of environmental and social impacts, and increasing regulatory requirements and public expectations. Inherent in this is community involvement and engagement—which are particularly critical to uranium mining activities—and a commitment to transparency and continuous improvement.

A common theme in many of the submissions provided to the Committee suggested that operational and regulatory practices and procedures should be best for the characteristics of the particular site, taking account of environmental, social and economic considerations. Indeed, best practice regulation in Australia is currently largely based on underpinning principles rather than a fixed set of practices or particular technologies. Outcome-based regulation has also been proven effective and efficient in Australia, and involves considerable constructive discussion between the proponent and the regulators, taking into account the views of other stakeholders, before the environmental outcomes to be achieved are set and the project approved¹⁵.

However, regulations that deal with public health and safety, including radiation protection, are commonly more prescriptive. In contrast, regulators in the United States and some other countries have used much more prescriptive approaches for all aspects of mining operations. These are not considered best practice for Australia, apart from health and safety aspects, as they transfer responsibilities for a range of matters from the operators to regulators and do not encourage innovation.

Best practice principles and approaches are well documented and practiced in the resources industry. A set of general principles considered best practice for regulation of mining generally (and applicable to uranium mining) in Australia has been developed by the Australian Government in Australia's In-Situ Recovery Uranium Mining Best Practice Guide 2010 (see footnote 16). The Committee considers these applicable to uranium mining in Queensland. With regard to radiation protection in mining, best practice is

¹⁵ Commonwealth of Australia, 2010, Australia's in-situ recovery uranium mining best practice guide, Canberra. Found at: <http://www.ret.gov.au/resources/documents/mining/uranium/in-situ-uranium.pdf> (page ii).

inherent in the Code of Practice and Safety Guide on Radiation Protection and Radioactive Waste Management in Mining and Mineral Processing (2005), which reflects the more prescriptive approach to health and safety issues.

Industry submissions to the Commission noted that best practice in Queensland necessitates three basic elements, applicable to regulators, proponents and stakeholders:

1. the mandatory framework of regulations, laws and policies
2. adherence to leading practice standards, guides, and to practice continual improvement, transparency and consultative methods
3. addressing 'social license' issues specific to mining uranium.

Expanding on these concepts, the Western Australian response to the Uranium Advisory Group Report¹⁶ identified five key features of what it called 'world best practice', including:

- a commitment by regulators, proponents and stakeholders to continual improvement in processes
- a shared commitment to openness and consultation at all stages of the mining lifecycle
- an emphasis on outcome-based regulation, wherever possible and appropriate
- transparency and consistency in regulatory systems and in decision making
- risk-based assessment and management of environmental, safety and social impacts.

As new challenges emerge and new solutions are developed, or better solutions are devised for existing issues, it is important that leading and best practice be flexible and innovative in developing solutions that match site specific requirements. Although there are underpinning principles, leading practice is as much about approach and attitude as it is about a fixed set of practices or a particular technology.

The term 'best practice' in relation to uranium mining also encompasses a number of other factors, including:

- a comprehensive understanding of the current environment, particularly groundwater and aquifer systems
- justification for the mining techniques proposed, including proposed practices and procedures to be undertaken by the uranium miner, including mine closure strategies
- the regulator setting and enforcing appropriate environmental outcomes and radiation safety standards, including long-term outcomes for post mine closure
- demonstration of the capability of the uranium miner to manage the operations on the site
- monitoring of the operation and environmental and health effects, to demonstrate that the environmental and radiation standards are being met. This includes public access to all monitoring results.

¹⁶ Based on the five key features identified as world's best practice in the Western Australian Department of Mines and Petroleum Response to the Uranium Advisory Group Report. Accessed at http://www.dmp.wa.gov.au/documents/121871_Independent_Review_of_Uranium_Mining_Reg.pdf

Best practice can be maintained by state based regulators maintaining skills and competency. In this context, maintaining a link with skilled areas, for example universities or leading expert bodies, will assist the Queensland Government to maintain 'best practice'.

Principles underlying regulation of uranium mining

Governments have a legitimate role in regulating the activities of business where those activities give rise to concerns about the wellbeing of either participants in the industry, or of the community more broadly. In relation to mining, governments also have a significant public interest role in managing access to limited and valuable publicly owned resources.

With the important exception that uranium is a radioactive substance, the regulatory regime for a uranium industry should mirror that for other resource commodities. However, an additional key objective of uranium mining regulation must be to provide a level of comfort to the community as well as to manage the genuine risks of uranium's radioactive status.

While government regulation of industries, including uranium, is clearly justified, poorly designed regulation is an important consideration, and can have a significant negative impact on business productivity and economic performance. The Council of Australian Governments (COAG) has established a number of criteria for regulation to ensure, as far as possible, that it is efficient and effective in meeting its objectives.¹⁷

The rationale for regulating mining, and reasons why adaptations may need to be made to the usual regulation of other mining activities for uranium is justified by:

- the obligation on mining companies to mine Queensland's valuable resources in a responsible manner, and to provide a financial return to the Queensland community in return for access to the uranium resource
- the need to ensure protection of the environment, particularly in sensitive areas
- Indigenous land rights and Native Title issues in areas in which mining activity is taking place
- occupational health and safety concerns associated with mining activities
- radiation protection issues applying to workers along all parts of the uranium supply chain, and to local communities more broadly
- the risks of proliferation of nuclear materials. In particular, safeguards established under the Australian commitment to the international non-proliferation treaty (NPT) aim to ensure that the use of Australia's exported uranium is only for peaceful and non-military applications.

The development of an appropriate regulatory framework for uranium mining should start in the first instance with the existing framework for mining generally and identification and consideration of any gaps directly related to the production of uranium. The

¹⁷ Best Practice Regulation - A Guide for Ministerial Councils and National Standard Setting Bodies, Council of Australian Governments (2007).

regulatory tools that comprise the whole framework should then be designed to specifically target and overcome these clearly defined and identified gaps.

Sustainability, stewardship, efficiency

Stewardship

Another theme expressed to the Committee during its consultation with stakeholders was the need for regulatory principles and practices which consider the full supply chain risk-based approach, from exploration and operation to disposal and decommissioning.

A uranium mining industry in Queensland will face a need to maintain its legitimacy and social acceptance. It will not be able to rely on simple compliance with laws and other requirements to achieve this.¹⁸ Potential uranium mining operators in Queensland will come under increasing pressure from government, consumers, shareholders, competitors, investors and communities to balance their pursuit of economic gain with environmental and social concerns and, by doing so, demonstrate their contribution to sustainable development.

Achieving broad acceptance by the community, as well as by regulators, is often referred to as 'having a social licence to operate'. Simply defined, the 'social licence to operate' is an unwritten social contract. Unless a company earns that licence, and maintains it on the basis of good performance on the ground, and community trust, there will undoubtedly be negative implications.

Communities may seek to block project developments, employees may choose to work for a company that is a better corporate citizen and projects may be subject to ongoing legal challenge, even after regulatory permits have been obtained, potentially halting project development.

The Australian minerals industry strongly supports the role of a 'social licence to operate' as a complement to a regulatory licence issued by government. To the minerals industry 'social licence to operate' is about operating in a manner that is attuned to community expectations and which acknowledges that businesses have a shared responsibility with government, and more broadly society, to help facilitate the development of strong and sustainable communities. The concept of 'stewardship' (which includes product, land and community) is also a key component of this operating principle.

Encouraging a Queensland uranium industry attitude that is based on concepts of stewardship would be ideal and should be encouraged where possible. A stewardship approach is about demonstrating that uranium is produced, used and disposed of in a safe and acceptable manner, and taking a lifecycle approach which encourages use of leading practices for health, safety, environment, and social aspects along the value chain which emphasises waste minimisation and encourages recycling. (Under current safeguards arrangements, Australia is not responsible for the disposal or storage of waste resulting from uranium use in energy production.)

¹⁸ Source - A GUIDE TO LEADING PRACTICE SUSTAINABLE DEVELOPMENT IN MINING (DRET 2011)

The minerals sector has been a leader in applying the principles of stewardship to its activities and the benefits to business and society are evident. The mining industry is often judged by the public on the basis of its worst performers. Implicit to stewardship is the need and opportunity to act beyond traditional business boundaries, since the objective is improving economic, environmental and social performance around whole value chains and lifecycles.

Sustainability

In the minerals sector, sustainable development means that investments in minerals projects should be financially profitable, technically appropriate, environmentally sound and socially responsible.

The Australian mining sector is recognising that its future is linked to the pursuit of sustainable development, which means operating in a manner that is attuned to community expectations and which acknowledges that business has a shared responsibility with government, and with broader society, to help to facilitate the development of strong and sustainable communities. Mining can contribute to sustainable development by focusing on successful economic, environmental, safety and health, efficiency and community outcomes.

For both ethical and business reasons, a mining operation should prioritise safety and health. This includes a commitment to risk management; appropriate attitudes and behaviours; reporting systems; education and training; and a focus on processes and equipment.

In addition to ethical and moral obligations, adopting leading environmental management practices on and off mine sites makes excellent business sense. Steps must be taken in the planning and operational stages to protect environmental values, avoiding long-term liabilities.

Unless a mine is profitable, it cannot be sustainable. The aim is to generate profit responsibly for as long as possible by keeping costs to a minimum while maximising revenue. This will also maximise the equitable benefits to all stakeholders, including shareholders, employees, local communities and businesses, which depend on the mine, as well as the governments that benefit by means of taxes and royalties.

A mine also needs a 'social licence to operate'. Unless the community is engaged and supportive of a mining operation, opposition and confrontation may ensue. Dysfunctional community interaction will ultimately distract management from its main focus of efficiently running the mine.

Leading Practice Sustainable Development Program (LPSDP)

The federal Department of Resources, Energy and Tourism (DRET) have published a series of booklets dealing with the Leading Practice Sustainable Development Program (LPSDP). These booklets represent a benchmark for the mining industry in the way to

develop and produce mineral resources, including uranium. Topics specifically relevant to uranium mining are covered within the series.

These publications are aimed at assisting all sectors of the minerals industry to protect the environment and to reduce the impacts of minerals production by following the principles of ecologically sustainable development. It should be of value to practitioners involved in the supply chain for exploration, mine planning, mining, mineral processing and mine closure¹⁹.

These publications also provide information that allows the general community to gain a better appreciation of the environmental and social management practices applied by the minerals industry. They emphasise practical, cost-effective approaches to protecting the environment and supporting the community that exceed the requirements set by regulation. The LPSDP booklets include case studies to encourage better environmental performance in Australia and internationally. These case studies demonstrate how the resources sector can apply leading practice in diverse environments across Australia, while allowing flexibility for specific sites.

Major international initiatives to promote sustainability in mining are also being pursued through:

- International resources for Best Practice Environmental Management, accessible through the United Nations Environment Programme (UNEP)²⁰
- The Global Mining Initiative²¹; and
- The Mining, Minerals and Sustainable Development Project²².

Best practice policy framework – from exploration to export

The remainder of this report details the regulatory systems which apply to uranium mining, and aspects of a framework that address additional challenges and requirements for uranium mining in Queensland.

A best practice policy and regulatory framework in Queensland must consider both the approvals environment and operational environment from exploration to the point of export.

At the highest level, the principle issues are: ensuring that a system is in place to ensure the adoption of best international practice in the design and implementation of uranium mining projects; ensuring that key stakeholders are consulted and informed during project development and approval and also during operations; and ensuring that rehabilitation and closure issues are considered from the outset and plans developed for these activities.

¹⁹ The DRET publications can be sourced at: A Guide to Leading Practice Sustainable Development in Mining (2011) <http://www.ret.gov.au/resources/documents/lpsdp/guidelpsd.pdf>.

²⁰ <http://www.mineralresourcesforum.org/tutorial.htm>.

²¹ <http://www.globalmining.com/index.asp>

²² <http://www.iied.org/mmsd/>.

A robust framework should be capable of addressing the below considerations and questions.

Governance and communication

Uranium mining, perhaps more than other minerals, requires systems which provide for transparent communication, early and ongoing consultation and community education. Do existing governance systems in Queensland have necessary scope and capacity to effectively incorporate regulation of a uranium mining industry. An effective, streamlined and responsive governance system to lead a robust and reliable regulatory system is a pre-requisite.

Tenure system

Will amendments be needed to the current tenement tenure approvals process for uranium exploration and mining proposals?

Environmental impacts and protections

Regulatory models around environmental protection broadly focus on:

- regulating the environmental impact assessment carried out in advance of project approvals and commencement
- regulating the exploration, planning, construction, operation, rehabilitation and decommissioning of a project through conditions attached to the project's approvals.

The following environmental themes and their management will form the centerpiece of each uranium mine's environmental management system and approval conditions. Each mine's system will need to be tailored to the site specific conditions, however these topics are likely to require consideration on most, if not all, uranium mine sites:

- use of outcome-based approvals in uranium mining
- surface and groundwater management, and biodiversity
- radiation protection (including air and dust)
- waste management, and rehabilitation requirements (including agricultural productivity and native ecosystems)
- compliance and enforcement
- consultation.

Will this type of system and considerations be adequate for addressing any environmental impacts which may be unique to uranium mining?

Mining health and safety

Are existing Queensland laws relating to mining safety and health capable of regulating uranium mining in Queensland to best practice leading standards? What, if any, amendments or changes are needed to provide for the hazards that are unique to uranium?

Economic, industry and community development

An understanding of the key considerations that companies need to factor into their decision to pursue uranium mining in Queensland is needed. This understanding will assist with identifying strategies the Queensland Government could implement to

encourage investment, development and market demand for the uranium sector. Equally, how can industry best contribute to regional and community development opportunities including job creation and address any social impacts?

Radiation protection and health

Queensland Health currently regulates health and security issues which specifically relate to exposure to radiation, in the main off mine sites. Will this remit be adequate for increasing levels of uranium mining activities including transport, incidents off mine site, and in providing advice post mine activity?

Transportation

How should safety, security and logistics issues be considered with the mining, transport and export of uranium and how should uranium product be transported in Queensland? Are existing approved transport and export means and locations appropriate for a Queensland based industry? How should the Queensland Government deal with any future application to export uranium from a Queensland port?

Native Title and Indigenous considerations

Do existing controls or regulation for protecting cultural heritage, historical, sacred sites, and traditional food sources, need to be strengthened specifically for uranium mining activities in Queensland? What considerations and measures need to be in place for Indigenous rights and interests in land in areas where potential uranium companies seek to operate?

How can industry best provide for real opportunities for Indigenous Queenslanders, including employment and training, partnerships with industry? How can industry best contribute to regional and community development opportunities including job creation and address any social impacts?

How should potential uranium companies engage with local Indigenous communities; what are the most effective methods for ongoing dialogue and information exchange; and how can commercial mining agreements with Indigenous communities be better negotiated, and developed?

Interactions with current reforms, the Australian Government and other jurisdictions

A regulatory framework in Queensland must work in cooperation with the Australian Government's regulatory system. Equally, opportunities for harmonisation of standards with other uranium mining jurisdictions would be advantageous. There are currently significant resource sector reforms underway in Queensland, and these too will need to be considered to ensure any additional requirements for a uranium industry can be aligned.

Mineral royalty regime and cost recovery for government regulatory functions

Is the current mineral royalty regime appropriate for uranium extraction in Queensland? Will it balance commercial considerations with the resource's worth and values, and can existing government fees and charges directly apply to uranium mining and will they recover the full cost of regulatory functions (and should they)?

3. The uranium industry – regulatory and institutional environment

Chapter 3 provides an overview of the current regulatory and institutional framework applied to uranium mining activities in Australia, including governance arrangements and the roles and responsibilities of the key regulatory stakeholders involved. Examples of international regulatory systems are discussed, namely Canada and the United States, including a brief look at key experiences in these regions. The chapter identifies commonly accepted strengths and shortcomings of the existing Australian system. A summary of the Committee's field trips is provided in Appendix C at the end of the report, with a focus on the Committee's observations of regulation and operational practices in other jurisdictions.

The overarching regulatory environment currently applicable to the uranium mining cycle in Queensland is outlined in this chapter. However, specific detail on legislative and approval processes and the Committee's recommendation to use the Coordinator-General's 'coordinated projects' process, is examined in Chapters 4, 5, and 6. These chapters discuss statutory processes in the context of describing the best practice framework the Committee believes should be applied in Queensland.

Key observations

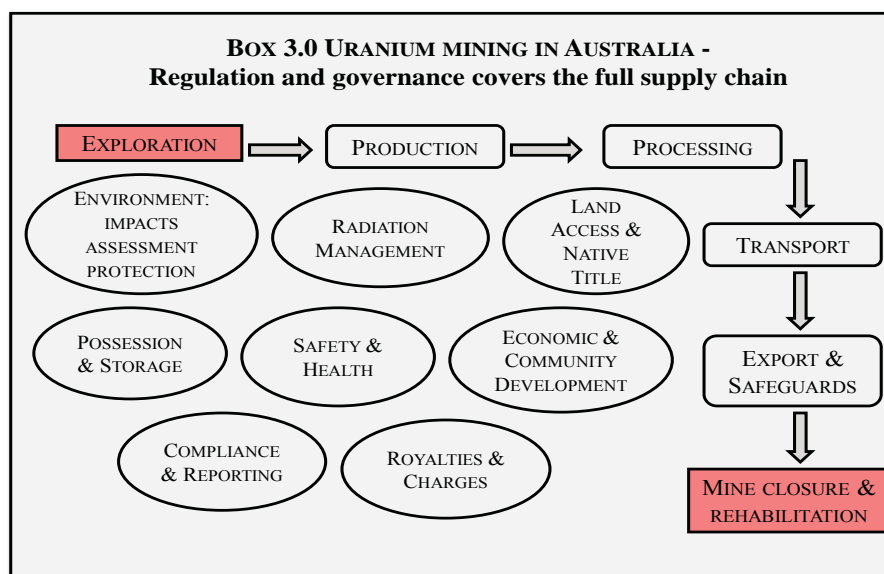
- The regulatory framework for the uranium industry is well established in Australia. The mining of uranium is similar to that of other minerals and the approval process often reflects this. In addition to the standard processes, there are a significant number of statutory frameworks in place at the state, federal and international level that ensure safe practices across the whole supply chain.
- Uranium mining proposals involve integrated consideration under both federal and state or territory legislation. The Australian Government also has interests in uranium arising from its international responsibilities, including in relation to export controls and nuclear safeguards.
- There are no specific legislative prohibitions on uranium exploration, mining and export in Queensland. The previous ban on uranium mining was in place by virtue of the 'public interest' powers under the *Mineral Resources Act 1989* (Qld), however exploration has continued to be permitted.
- In Queensland, a sophisticated, robust regulatory framework and processes exist across the mineral resources sector supply chain, which apply to uranium as a mineral.
- The Queensland regulatory regime and approvals process has accommodated industries associated with the mining of radioactive materials (such as mineral sands and tantalum) for a number of decades.
- The existing regulatory framework in Queensland is essentially the same framework as for mining generally, with the addition of laws governing radiation protection and specific export policies.
- International regulatory systems are generally focused on regulating the environmental impact assessment carried out in advance of project approvals and commencement, and on regulating the exploration, planning, construction, operation, rehabilitation and decommissioning of a project through approval conditions.

- The main shortcomings of Australia's uranium mining regulation relate to duplication of roles between federal and state processes.

3.1 Introduction

All mining and petroleum resources in Australia are owned by the Crown vested in the relevant state. In general, individuals or companies may apply to explore or extract those resources. Various government agencies (in Queensland's case the Department of Natural Resources and Mines (DNRM)) manage those resources on behalf of the state via a regulatory framework administering relevant legislation. Legislation provides a way to assess, develop and utilise the mineral and petroleum resources for the benefit of Australia, the particular state, and its people.

Australia's broad framework for regulating uranium exploration, production and export dates to the early 1950s when uranium was seen as having strategic value in the Cold War political environment. This framework has evolved significantly since that time into a complex system of integrated legislation, guidelines and policies administered by a variety of agencies and organisations, covering the full supply chain, from exploration to export and mine closure and rehabilitation (refer to Box 3.0).



While the general approach to regulating uranium mining has been no different to that of other mining industries, radiation protection and nuclear non-proliferation issues are almost unique to uranium mining. This has necessitated additional uranium specific safety, health, and security approval processes.¹

The resulting regulatory framework (Box 3.1) governing the uranium mining industry is jointly administered by the relevant states and the Australian Government, and owes much of its form to the division of powers and responsibilities under the Australian Constitution.

Most of the day-to-day regulation of uranium exploration and production (including tenure approvals) is the responsibility of the respective state and territory governments. Although, the Australian Government has specific responsibilities relating to safety oversight and export controls which implement Australia's

¹ Much of this standard factual material has been sourced from the Queensland Resources Council submission to the Commission.

international obligations under the Nuclear Non-Proliferation Treaty (1970). The Australian and state governments also share responsibilities for protecting the environment against damage that may occur as a result of uranium mining.

The most significant evolution of the framework has been the increasing role of the Australian Government and state governments in the area of environmental regulation, as evidenced through² the:

- development of environmental protection legislation by the states and the Northern Territory, and the use of environmental impact assessment as part of the approvals approach for mining activities
- *Environment Protection (Impact of Proposals) Act 1974* (Cwlth) (EPIP), which gave the Australian Government a role in environment impact assessment
- Ranger Uranium Environmental Inquiry (the “Fox Inquiry”) into the proposed uranium mine, which was conducted between 1975-77, and which established the Australian Government as an active participant in environmental, social and Indigenous issues associated with uranium mining (and contributed to the establishment of Kakadu National Park)
- *Environment Protection and Biodiversity Conservation Act 1999* (Cwlth) (EPBC Act), which replaced the EPIP Act, specifically identifies uranium mining as a matter of national environmental significance subject to specific federal ministerial approval.

Box 3.1 Broad regulatory framework for uranium mining in Australia

- The regulation of **exploration** under state and federal resources industry laws
- **Environmental** assessment and approval conducted under both state and federal environmental laws with the final approval resting with the Australian Government
- The regulation and management of **radiation** issues associated with uranium exploration and mining (and other industries) mainly by state laws derived from globally accepted evidence and principles under guidance from the codes promulgated by the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA)
- State regulation of **transport** of uranium under radiation protection laws, ARPANSA’s *Code of Practice for the Safe Transport of Radioactive Materials* and the *Nuclear Non-proliferation (Safeguards) Act 1987* (Cwlth)
- Public reporting of aspects of uranium industry operational performance, including under **reporting** requirements associated with environmental approval conditions
- The **export** of uranium only for peaceful purposes under longstanding federal policy and regulation.

The Australian Government has also taken an increasingly stronger global stance in relation to nuclear weapons proliferation since the late 1970s, and this has been reflected in the evolving rigour of Australia’s uranium exports policies and nuclear non-proliferation safeguards.

² Paladin Energy Ltd submission to the Committee
Recommencement of uranium mining - a best practice framework.

3.2 Australia's national regulatory framework

Given the shared regulatory responsibility of uranium, there are a number of similarities and common features of each of the regulatory regimes operating in the three jurisdictions that permit uranium mining (South Australia, Western Australia and the Northern Territory). These similarities include:

- exploration, retention and production licensing for access to uranium resources
- general and uranium-specific conditions to environmental approvals
- federal oversight of environmental impact assessment procedures
- requirements for radiation management plans in conducting activities associated with the mining and handling of uranium
- adoption of federal codes of practice and guidelines for radiation monitoring and management associated with the mining, possession and transport of uranium
- requirements for state based storage and transport approvals.

There are also noticeable differences among each of the regimes owing to a variety of legacy issues and administrative structures. For example, the Australian Government retains ownership and control of uranium resources in the Northern Territory under the provisions of the *Northern Territory (Self Government) Act 1978* and the *Atomic Energy Act 1953* (Cwlth). In Western Australia a single 'lead agency' assists with the coordination of uranium mining approvals in contrast to the multiple agencies with regulatory functions in South Australia and the Northern Territory.

Table 3.0 provides an overview of the regulatory framework currently applicable to uranium mining activities in Australia, by jurisdiction and activity, including key legislation and key institutional stakeholders within the system.

Table 3.0 Overview of Australia's existing regulatory regime – uranium mining³

	Australian Government	Northern Territory	South Australia	Western Australia	Queensland
Key legislation	<p><i>Nuclear Non-Proliferation (Safeguards) Act 1987</i></p> <p><i>Atomic Energy Act 1953</i></p> <p><i>Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)</i></p> <p><i>Environment Protection (Alligator Rivers Region) Act 1978</i></p> <p><i>Aboriginal Land Rights (Northern Territory) Act 1976</i></p> <p><i>Australian Nuclear Science and Technology Organisation Act 1987</i></p> <p><i>Australian Radiation Protection and Nuclear Safety Act 1998</i></p> <p><i>Native Title Act 1993</i></p>	<p><i>Mining Act 1980</i></p> <p><i>Mining Management Act 2001</i></p> <p><i>Radioactive Ores (Packaging and Transport) Act (NT)</i></p>	<p><i>Mining Act 1971</i></p> <p><i>Development Act 1993</i></p> <p><i>Radiation Protection and Control Act 1982</i></p> <p><i>Roxby Downs (Indenture Ratification) Act 1982</i></p> <p><i>Environmental Protection Act 1993</i></p>	<p><i>Mining Act 1978</i></p> <p><i>Environment Protection Act 1986</i></p> <p><i>Radiation Safety Act 1975</i></p> <p><i>Mines Safety and Inspection Act 1994</i></p> <p><i>Radiation Safety (Transport of Radioactive Substances) Regulations 2002 (WA)</i></p>	<p><i>Mineral Resources Act 1989 (MR Act)</i></p> <p><i>Radiation Safety Act 1999 (RS Act)</i></p> <p><i>Environmental Protection Act 1994 (Qld) (EP Act)</i></p> <p><i>Mining and Quarrying Safety and Health Act 1994 (Qld) (MQSH Act)</i></p> <p><i>State Development and Public Works Organisation Act 1971 (SDPWO Act)</i></p> <p><i>Nuclear Facilities Prohibition Act 2007 (Qld) (NFP Act)</i></p>
Exploration and production tenure	<p>The grant of mining tenure is generally a matter for the state governments.</p> <p>The Australian Government retains specific jurisdiction in relation to uranium exploration and mining in the Northern Territory (NT) under the <i>Atomic Energy Act 1953</i> (Cwth).</p> <p>Those who discover uranium in any part of Australia must notify the Australian Government.</p>	<p>The holder of an exploration licence is authorised to explore for all minerals.</p> <p>Generally, the grant of a mineral lease is not commodity-specific.</p> <p>Both an exploration licence and a mineral lease cannot be granted for uranium unless the federal Minister</p>	<p>Exploration licences and mineral leases are granted in relation to specific commodities, including uranium.</p> <p>A specific endorsement from the Minister under the <i>Radiation Protection and Control Act 1982</i> (SA) is required in order to mine for uranium.</p>	<p>Exploration licences are not commodity specific and can therefore be used to explore for uranium.</p> <p>Generally, the grant of a mining lease is not commodity-specific. However, the Minister has the discretion to restrict the lease to specific minerals if it is</p>	<p>The definition of 'mineral' in the MR Act encompasses uranium.</p> <p>An exploration permit may be granted specifically for coal or for all other minerals. An exploration permit for minerals may therefore be granted in relation to uranium.</p> <p>Mining leases are granted in relation to specific commodities.</p>

³ New South Wales, Victoria, and Tasmania excluded. In Victoria exploration and mining of uranium is currently prohibited (Relevant legislation: *Nuclear Activities (Prohibitions) Act 1983*). In New South Wales exploration is now allowed but mining is currently prohibited (Relevant legislation: *Mining Act 1992 No.29; Mining Amendment Act 2008 and Mining Regulation 2010; Uranium Mining and Nuclear Facilities (Prohibitions) Act 1986*). In Tasmania there are no legislative prohibitions on exploration or mining uranium.

		for Resources is consulted. An MOU is in place between Australian Government and NT Government in relation to working arrangements for the regulation of uranium mining (effectively recognises day to day responsibility to NT)		in the public interest to do so (e.g. under a state agreement).	
Environmental assessment	The Australian Government determines how the environmental impacts of uranium mining will be assessed and will determine whether to approve the mine or not under the EPBC Act and, if approved, on what conditions. Provides the Australian Government with environmental jurisdiction in seven areas of 'national environmental significance.	An environmental assessment will be required under the <i>Environmental Assessment Act 1982</i> (NT) and <i>Environmental Assessment Administrative Procedures 1984</i> (NT) if the proposed activities could have a significant effect on the environment. As assessment will be required under the EPBC Act in advance of mining activities. The provisions of the bilateral agreement between the Australian Government and the Northern Territory Government relating to environmental impact assessment will apply.	An environmental assessment will be required under the <i>Development Act 1993</i> (SA) if the proposed activities could have a significant effect on the environment. Can attach environmental conditions to relevant approvals and authorisations. As assessment will be required under the EPBC Act in advance of mining activities. The provisions of the bilateral agreement between the Australian Government and the South Australian Government relating to environmental impact assessment will apply.	An environmental impact assessment is required under the <i>Environmental Protection Act 1986</i> (WA) for proposals likely to have a significant effect on the environment. Can attach environmental conditions to relevant approvals and authorisations. As assessment will be required under the EPBC Act in advance of mining activities. The provisions of the bilateral agreement between Queensland relating to environmental impact assessment will apply.	Environmental impact assessment will be required under the EP Act or the SDPWO Act. Environmental conditions are attached to relevant approvals and authorisations. As assessment will be required under the EPBC Act in advance of mining activities. The provisions of the bilateral agreement between Queensland relating to environmental impact assessment will apply.
Other environmental: - waste management - rehabilitation	Usually controlled through conditions on the approval under the EPBC Act.	Usually controlled under conditions on environmental and other project approvals. The federal Department of	Usually controlled under conditions on environmental and other project approvals.	Usually controlled under conditions on environmental and other project approvals.	Controlled under Environmental Authority (EA) conditions determined under the EP Act.

<ul style="list-style-type: none"> - operational requirements - point sources to air - dust and particulate matter - tailings disposal - waste rock disposal 		<p>Sustainability, Environment, Water, Population and Communities (SEWPAC) contains a statutory position of Supervising Scientist established to provide specific environmental oversight and research and monitoring of uranium mining in the Alligator Rivers region.</p>			
<p>Occupational health and safety</p>	<p>The Australian Government does not have occupational health and safety law which applies specifically to uranium mining, although it would be captured generally under the <i>Work Health and Safety Act 2011</i> (Cwth).</p>	<p>The <i>Work Health and Safety (National Uniform Legislation) Act 2012</i> (NT) and associated regulation govern the general occupational health and safety issues associated with uranium mining.</p>	<p>Uranium mining is addressed through the <i>Occupational Health, Safety and Welfare Act 1986</i> (SA) and its associated regulation. The Act sets out general obligations in relation to health and safety, while the regulation provides specific obligations in relation to mining generally.</p>	<p>Occupational health and safety for uranium mines is largely regulated by the <i>Mines Safety and Inspection Act 1994</i> (WA) and associated regulations. The Act sets out general obligations in relation to mining and the regulation addresses</p>	<p>The MQSH Act would currently regulate operational mining safety and health aspects of uranium mining.</p>
<p>Radiation management</p>	<p>The <i>Australian Radiation Protection and Nuclear Safety Act 1998</i> (Cwth) (ARPANSA) addresses the control of radioactive material.</p> <p>Includes:</p> <ul style="list-style-type: none"> - code of practice and safety guide for radiation protection and radioactive waste management - recommendations for limiting exposure to ionising radiation - national standards for limiting occupational exposure to ionising radiation - code of practice and safety 	<p>The <i>Radiation Protection Act 2004</i> (NT) addresses protection from radiation sources at mines. Requires Radiation Management Plan; and Requires compliance with ARPANSA.</p>	<p>The <i>Radiation Protection and Control Act 1982</i> (SA) provides guidance in relation to radiation arising from uranium mining. Requires Radiation Management Plan; and Requires compliance with ARPANSA.</p>	<p>The <i>Radiation Safety Act 1975</i> (WA) includes additional obligations in relation to managing radioactive substances. Requires Radiation Management Plan; and Requires compliance with ARPANSA.</p>	<p>The RS Act addresses the management of exposure to radiation, and protection of health and safety of people and the environment. Requires Radiation Management Plan; and Requires compliance with ARPANSA.</p>

Possession and storage	<p>guide for the safe transport of radioactive material.</p> <p>A permit is required for the possession of nuclear material (including uranium) from the Australian Safeguards and Non-Proliferation Office (ASNO) under the <i>Nuclear Non-Proliferation (Safeguards) Act 1987</i> (Cwth).</p> <p>This Act also contains conditions regarding the security of storage of the nuclear material.</p> <p>ASNO also ensures</p> <ul style="list-style-type: none"> - security of, and carries out nuclear material accounting and control functions for, nuclear materials in Australia; - the <i>Nuclear Non-Proliferation (Safeguards) Act 1987</i> (Cwth) giving effect to Australia's obligations under the Non-Proliferation Treaty; Safeguards Agreement and Additional Protocol with the IAEA; agreements between Australia and various countries concerning transfer of nuclear material; and the Convention on the Physical Protection of Nuclear Material. 	<p>Requires that a person must not manufacture, sell, acquire, possess, use, store, transport, dispose of or otherwise deal with a radiation source under the <i>Radiation Protection Act 2009</i> (NT).</p>	<p>Requires that a person must not be in possession of a radiation source unless authorised by a licence under the <i>Radiation Protection and Control Act 1982</i> (SA).</p> <p>Registration of premises and licence of facility storing a radiation source also required under this Act.</p>	<p>Possession of 'radioactive substances' requires a licence of authorised persons and registration of owners of premises under the <i>Radiation Safety Act 1975</i> (WA).</p> <p>Licensing of storage of 'radioactive substances' also under this Act.</p>	<p>A person must not possess a 'radiation source' (including uranium) unless a person holds a possession licence under the RS Act, with different conditions required depending on the security category of the radiation source.</p> <p>A person who holds a possession licence under the RS Act must also obtain a certificate of compliance for the premises storing the 'radiation source'.</p>
Transport	<p>A permit must be obtained from ASNO to transport uranium in accordance with the <i>Nuclear Non-Proliferation (Safeguards) Act 1987</i> (Cwth) and the ARPANSA.</p> <p>Permit holders must comply with the Code for Safe Transport of Radioactive Material 2008 (Transport Code) which adopts IAEA Regulations for the Safe Transport of Radioactive Material.</p>	<p>Additional territory-based licence to transport uranium is required under the <i>Radioactive Ores and Concentrates (Packaging and Transport) Act 1980</i> (NT) from the Chief Inspector (appointed by the Northern Territory Minister for Justice).</p> <p>Conditions may be attached to the licence</p>	<p>No additional state-based licence required.</p> <p>Transport must be conducted in accordance with the <i>Radiation Protection and Control (Transport of Radioactive Substance) Regulation 2003</i> (SA).</p> <p>This regulation adopts the 2001 version of the</p>	<p>Additional state-based licence to transport uranium is required under the <i>Radiation Safety Act 1975</i> (WA) from the Radiological Council (an independent statutory body).</p> <p>Transport must also be conducted in accordance with the</p>	<p>Additional state-based licence to transport uranium (being a 'radioactive substance') is required under the RS Act from Radiation Health (a unit of Queensland Health).</p> <p>Different transport licences are required where 'radioactive substances' are transported by road or rail. A transport licence for road may only be held by an individual.</p>

	<p>ASNO must approve a transport plan (i.e. route and means of transport).</p>	<p>including route, mode of transport, carrier and time of transport. Specific records must be kept in accordance with the <i>Radioactive Ores and Concentrates (Packing and Transport) Regulation 1980 (NT)</i>.</p> <p>The Transport Code is incorporated into Northern Territory legislation through the <i>Radioactive Ores and Concentrates (Packaging and Transport) Act 1980 (NT)</i> and the <i>Work Health and Safety (National Uniform Legislation) Act 2011 (NT)</i> and is administered by the Northern Territory Work Health Authority.</p>	<p>Transport Code with minor amendments and is administered by the South Australian Environmental Protection Authority.</p>	<p><i>Radiation Safety (Transport of Radioactive Substances) Regulation 2002 (WA)</i>.</p> <p>This regulation adopts the 2001 version of the Transport Code with minor amendments and is also administered by the Radiological Council.</p>	<p>Transport must also be conducted in accordance with the <i>Radiation Safety Regulation 2010 (Qld)</i>, which adopts the Transport Code.</p> <p>A transport security plan which addresses specific matters in the <i>Radiation Safety Regulation 2010 (Qld)</i> will also be required.</p>
<p>Native Title and cultural heritage</p>	<p>National requirements contained in the <i>Native Title Act 1993 (Cwth)</i> (NT Act) - provides Aboriginal and Torres Strait Islander people a process for negotiation and compensation where the land is to be leased out by the state for mining. Proponent is obligated to address potential impacts on native title rights and interests, agreeing on managing these impacts, and what compensation or consideration, often under an Indigenous Land Use Agreement.</p> <p>Indigenous cultural heritage management has historically been a state or territory issue, however the <i>Aboriginal and Torres Strait Islander Heritage Protection Act 1984</i> was designed to provide intervention where needed (these powers have</p>	<p><i>Aboriginal Land rights (Northern Territory) Act 1976</i> establishes Land Councils to represent interests of Aboriginal Traditional Owners.</p> <p>Sets out conditions for access to Aboriginal land.</p> <p>Indigenous heritage is addressed by two separate statutory approaches, the <i>Heritage Conservation Act 1991 (NT)</i> (the Heritage Conservation Act) and the <i>Northern Territory Aboriginal Sacred Sites Act 1989 (NT)</i> (the Sacred Sites Act).</p>	<p><i>Native Title Act (SA) 1994</i> – determination and protection of Native Title.</p> <p>Legislation provides for a form of Aboriginal freehold title and imposes strict conditions on land access.</p> <p><i>Aboriginal Heritage Act 1988 (SA)</i> recognises that the Minister is responsible for the protection of Aboriginal heritage, but includes provisions for the Minister to delegate some powers to a state wide Aboriginal Heritage Committee.</p>	<p>Applicants for Exploration Licences and Prospecting Licences must sign a Regional Standard Heritage Agreement or prove they have an existing Alternative Heritage Agreement before the applications will be submitted to the NTA Expedited Procedure (Kimberley Region excluded).</p> <p><i>Aboriginal Heritage Act 1972</i>.</p>	<p><i>Aboriginal Land Act 1991</i> and the <i>Torres Strait Islander Land Act 1991</i> – provide for a system of community-level land trusts. Any tenure grant over these areas must have due regard to the views of the Trustee (usually resulting in a negotiated agreement between the parties).</p> <p><i>Aboriginal Cultural Heritage Act 2003</i> can require negotiation of a Cultural Heritage Management Plan (mandatory for projects subject to an EIS).</p>

	rarely been used). Heritage provisions are also included under the EPBC Act.	Uraniun is exported from Darwin.	Uraniun is exported from Adelaide.	WA Government has made a policy decision not to export uraniun from any ports in WA.	Uraniun has previously been exported from the Port of Townsville.
Export and import controls	<p><i>Customs (Prohibited Exports) Regulations 1985</i> (Cwith) under the <i>Customs Act 1901</i> (Cwith) Licence to export must be obtained from federal Resources Minister.</p> <p>Applications for permission to export are assessed by the DRET and ASNO.</p> <p>Export must comply with Australia's Uranium Export Policy.</p>	Uraniun is exported from Darwin.	Uraniun is exported from Adelaide.	WA Government has made a policy decision not to export uraniun from any ports in WA.	Uraniun has previously been exported from the Port of Townsville.
Uranium conversion, enrichment, fabrication and nuclear power generation	<p>Prohibited under the EPBC Act and ARPANSA Act. No further stages of the nuclear fuel cycle beyond mining of uraniun are allowed in Australia.</p> <p>Radioactive material generated by ANSTO that is used in medical, research and industrial applications is regulated by state and territory legislation.</p>	Prohibited	Prohibited	Prohibited	Prohibited <i>Nuclear Facilities Prohibition Act 2007</i> (Qld) (NFPA).
Key institutions and agencies	<p>Department of Resources, Energy and Tourism (DRET)</p> <ul style="list-style-type: none"> - Export and shipping approvals - <i>Atomic Energy Act 1976</i> - Uranium Council <p>Department of Sustainability, Environment, Water, Population, and Communities (SEWPaC)</p> <ul style="list-style-type: none"> - Environmental approvals (EPBC Act) - Supervising Scientist - Indigenous Heritage <p>ASNO</p>	<p>Department of Primary Industry, Fisheries and Resources</p> <p>Department of Justice</p> <p>NT WorkSafe</p> <p>Department of Sustainability, Environment, Water, Population, and Communities (SEWPaC)</p>	<p>Primary Industry and Resources SA (PIRSA)</p> <p>Environmental Protection Authority SA (EPA SA)</p> <p>SafeWork SA</p>	<p>Department of Mines and Petroleum</p> <p>Environmental Protection Authority</p> <p>Radiological Council</p> <p>Department of Environment and Conservation</p>	<p>Department of Natural Resources and Mines (DNRM)</p> <ul style="list-style-type: none"> - MR Act and MQSH Act - Tenure and lease approvals - Mine safety and health <p>Department of Environment and Heritage Protection (EHP)</p> <ul style="list-style-type: none"> - EP Act and Environmental approvals and monitoring <p>Queensland Health</p> <ul style="list-style-type: none"> - RS Act

	<ul style="list-style-type: none"> - Permits to establish and decommission - Permits to possess, transport and store. - Safeguards - Physical Protection (Nuclear Security) - implements the Uranium Producers Charge - Australian Maritime Safety Authority - Transport of Class 7 Dangerous Goods <p>Attorney-General</p> <ul style="list-style-type: none"> - Native Title <p>Australia Radiation Protection and Nuclear Safety Agency (ARPANSA)</p> <ul style="list-style-type: none"> - Standards, Codes of Practice and Guidelines for radiation protection. 			<ul style="list-style-type: none"> - Radiation protection, safety and health <p>Coordinator-General</p> <ul style="list-style-type: none"> - SDPWO Act - Potential coordination of environmental assessment and conditions <p>Treasury and Trade – Office of State Revenue</p> <ul style="list-style-type: none"> - Royalties <p>Department of State Development, Infrastructure and Planning</p> <ul style="list-style-type: none"> - Industry and community development <p>Department of Aboriginal and Torres Strait Islander and Multicultural Affairs (DATSIMA) and Department of Justice and Attorney-General (DJAG)</p> <ul style="list-style-type: none"> - Native Title - Indigenous policy
<p>Key international bodies</p> <ul style="list-style-type: none"> • United Nations - International Atomic Energy Agency (IAEA) <ul style="list-style-type: none"> - the world's central intergovernmental forum for scientific and technical cooperation in the nuclear field. - works with its member states to promote safe, secure and peaceful nuclear technologies. • World Nuclear Association <ul style="list-style-type: none"> - representation in key international forums - industry contacts and cooperation - nuclear fuel and supply chain (including uranium) - public information and news. • International Commission on Radiological Protection <ul style="list-style-type: none"> - develops and maintains the International System of Radiological Protection used world-wide as the common basis for radiological protection standards, legislation, guidelines, programs, and practice. • Nuclear Energy Agency of the Organisation for Economic Cooperation and Development (OECD). 				

3.3 Australian Government agencies, legislation and policies⁴

The Australian Government has in place various laws that have a profound impact on the development of Australia's uranium industry. These affect each of the major regulatory issues for the sector, namely access to the resource, environmental protection, Indigenous land rights, occupational health and safety, radiation protection and proliferation risks.

In general, federal acts and regulations overarch state acts and regulations to form an integrated framework. The following Australian Government agencies are involved in the regulation or governance aspects of the uranium mining industry:

- Department of Resources, Energy and Tourism (DRET) - *Atomic Energy Act 1953; Customs (Prohibited Exports) Regulations 1958*
- Department of Sustainability, Environment, Water, Population and Communities (SEWPaC) - *Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act); Aboriginal and Torres Strait Islander Heritage Protection Act 1984*
- Australian Safeguards and Non-Proliferation Office (ASNO) - *Nuclear Non-Proliferation (Safeguards) Act 1987*
- Australian Maritime Safety Authority (AMSA) - Marine Orders Part 41- Carriage of Dangerous Goods, Issue 10 (MO 41)
- Attorney General's Department (AGD) - *Native Title Act 1993*
- Australian Radiation Protection and Nuclear Safety Agency (ARPANSA)
- Australian Nuclear Science and Technology Organisation (ANSTO).

Department of Resources, Energy and Tourism

The Department of Resources, Energy and Tourism (DRET) develops policy and administers legislation relating to Australia's resources and energy industries, which includes uranium. DRET focuses on ways to encourage and manage the development and operation of Australia's uranium industry. It does this by reducing impediments to the development and operation of uranium projects, seeking to ensure a more consistent and accountable regulatory regime that meets environmental objectives and granting export permits.

The Australian Government's current policy⁵ is that uranium exploration and mining will only be approved subject to stringent environmental and safety requirements in line with world's best practice.

Uranium exports are administered through export permissions issued by the Minister for Resources and Energy pursuant to Regulation 9 of the *Customs (Prohibited Exports) Regulations 1958*. The Minister for Resources and Energy issues conditional export permissions pursuant to Regulation 9 for periods of 10 years, although this can vary.

⁴ Sourced mainly from the Department of Resources, Energy and Tourism submission to the Committee.

⁵ For detail on the Australian Labor Party's national platform in relation to uranium, see: <http://www.alp.org.au/australian-labor/our-platform/>.

Companies holding an export permission can only export after notification from ASNO that nuclear safeguards and security requirements in respect of the shipment have been satisfied. Exports can only be made to authorised recipients and pursuant to a contract containing a safeguards clause, which is monitored by DRET. On application, DRET issues shipping approvals to exporters for shipments of uranium. DRET also generates production, export and sales statistics on an annual basis.

DRET also administers the *Atomic Energy Act 1953*, under which the Ranger Uranium Mine (Northern Territory) is authorised to operate. The Australian Government retains ownership of prescribed substances in the Northern Territory (including uranium), and as such has a role in the regulation of Ranger. The Act also imposes a duty on any person discovering uranium in Australia to report that discovery to the federal Minister (via Geoscience Australia) within one month of the discovery.

Department of Sustainability, Environment, Water, Population and Communities (SEWPaC)

Environmental approvals⁶

The EPBC Act is the principal federal legislation affecting the mining, use and disposal of uranium. The key purpose of the Act is to clarify the matter of Australian Government jurisdiction in eight areas of national environmental significance. Nuclear actions, which include uranium mines, are one of these areas.

Under the EPBC Act, actions that have, or are likely to have, a significant impact on a matter of national environmental significance require approval from the federal Minister for Sustainability, Environment, Water, Population and Communities (the Minister). The Minister will determine if a project should undergo an environmental assessment and approval process. Under this model, environmental conditions are imposed on mines as licence conditions.

The eight matters of national environmental significance protected under the EPBC Act are:

- world heritage properties
- national heritage places
- wetlands of international importance (listed under the Ramsar Convention⁷)
- listed threatened species and ecological communities
- migratory species protected under international agreements.
- federal marine areas
- the Great Barrier Reef Marine Park
- nuclear actions (including uranium mines)

The EPBC Act recognises the protection of the environment from 'nuclear actions' as a matter of national environmental significance. A nuclear action will require approval if it has, will have, or is likely to have a significant impact on the environment. Defined nuclear actions under the EPBC Act are:

⁶ Further discussion on environmental approval issues and the EPBC Act is in Chapter 5. Additional detail specifically regarding assessment processes under the EPBC Act is available on the EPBC website: <http://www.environment.gov.au/epbc/index.html>.

⁷ The Convention on Wetlands (Ramsar, Iran, 1971) -- called the "Ramsar Convention" -- is an intergovernmental treaty that embodies the commitments of its member countries to maintain the ecological character of their Wetlands of International Importance and to plan for the "wise use", or sustainable use, of all of the wetlands in their territories.

- mining or milling uranium ores, excluding operations for recovering mineral sands or rare earths
- establishing or significantly modifying a large-scale disposal facility for radioactive waste⁸. A decision about whether a disposal facility is large-scale will depend on factors including the activity of the radioisotopes to be disposed of, the half-life of the material, the form of the radioisotopes and the quantity of isotopes handled
- decommissioning or rehabilitating any facility or area in which an activity described above has been undertaken
- establishing or significantly modifying a nuclear installation
- transporting spent nuclear fuel or radioactive waste products arising from reprocessing
- establishing or significantly modifying a facility for storing radioactive waste products arising from reprocessing
- any other type of action set out in the EPBC Regulations (regulations 2.01-2.03 currently).

The EPBC Act facilitates the making of bilateral agreements between the Australian Government and the state and territory governments to accredit their environmental assessment and approvals processes for proposed developments. Assessment bilateral agreements are in place with Queensland, Western Australia, Tasmania, New South Wales, South Australia and the Northern Territory.

This means the Australian Government is able to rely - to a large degree - on state or territory environmental assessment processes and, in limited circumstances, state or territory approvals. The state or territory will provide an assessment report to the federal Environment Minister, who retains ultimate responsibility for federal environmental approvals (in addition to state ministerial approval) and can require additional environmental conditions.

Supervising Scientist Division⁹

The federal Department of Sustainability, Environment, Water, Population and Communities includes the Supervising Scientist Division (SSD). The Supervising Scientist is a statutory position established under the *Commonwealth Environment Protection (Alligator Rivers Region) Act 1978*, and was established following the Australian Government's decision to approve uranium mining at Ranger, to meet the need for an independent supervisory body to ensure that the environment of the Alligator Rivers Region is protected from the potential impacts of uranium mining activities.

Chapter 4 of this report will go into more detail about options and the potential role and expertise that the Supervising Scientist could provide for environmental oversight of uranium mining activities (including environmental monitoring) in Queensland. The SSD is supported by two branches: (i) Office of the Supervising Scientist (OSS); and (ii) Environmental Research Institute of the Supervising Scientist (ERISS).

The key functions of the Supervising Scientist include:

- undertaking environmental research and reviews of the environmental performance of uranium mines in the Alligator Rivers region in the Northern

⁸ Note that uranium tailings facilities are generally regarded as radioactive waste disposal facilities, albeit classified as low-level waste (Independent Review of Uranium Mining Regulation, UAG, April 2012).

⁹ Link to full functions chart - <http://www.environment.gov.au/ssd/about/pubs/ssd-function-chart.pdf>

- Territory to ensure the region's environment, including Kakadu National Park, remains protected from the potential impacts of uranium mining
- provision of technical and policy advice to the Minister for Sustainability, Environment, Water, Population and Communities on a wide range of scientific matters and mining related environmental issues of national importance, including; radiological matters and tropical wetlands conservation and management; and
 - conducting environmental research on issues of national significance.

The Division maintains two facilities: a research/ laboratory facility in Darwin where most of the ERISS and OSS staff are based, and a Field Station at Jabiru, in Kakadu National Park, which supports the Division's environmental monitoring program.

The OSS undertakes a range of supervision, audit, policy and business support functions which include:

- periodic environmental audits and technical reviews of uranium mining operations, including exploration activities
- assessment of data from environmental monitoring undertaken by mining companies and the Northern Territory Department of Resources and the outcomes of scientific research undertaken by the Environmental Research Institute of the Supervising Scientist
- assisting with planning for, and assessment of, rehabilitation works at former mines
- provision of technical and policy advice to other divisions within the department, other Australian and Northern Territory Government agencies and the general public on a range of issues related to the impact of uranium mining on the environment and human health.

The ERISS undertakes independent scientific research and monitoring into the impact of uranium mining on the environment of the Alligators Rivers region (which incorporates Kakadu National Park).

Indigenous Heritage

Consideration of Indigenous heritage matters is not specific to uranium exploration and mining but may apply as for any development activity. *The Aboriginal and Torres Strait Islander Heritage Protection Act 1984* enables the Australian Government to respond to requests to protect traditionally important areas and objects that are under threat, if it appears that state or territory laws have not provided effective protection. The government can make special orders, called declarations, to protect significant Aboriginal areas, objects and classes of objects from threats of injury or desecration.

The government cannot make a declaration unless an Aboriginal or Torres Strait Islander person (or a person representing an Aboriginal or Torres Strait Islander person) has requested it and has provided satisfactory evidence of a body of traditions, customs, observances and beliefs that explains, firstly, why there is a threat of injury or desecration and, secondly, why the area, object or class of objects is of particular significance to Aboriginal or Torres Strait Islander people. The power to make declarations is meant to be used as a last resort, after the relevant processes of the state or territory have been exhausted.

There is a long standing government project to reform the Aboriginal and Torres Strait Islander Heritage Protection Act 1984. An independent review of the Act was completed in 1996. A reform Bill was tabled in 1998 but lapsed. In August 2009 the

government released a discussion paper that contained new reform proposals aimed at reducing red tape while enhancing state processes for protecting sacred sites. Central to these aims was a proposal to accredit states and territories based on 20 draft national standards. In August 2011, the Australian Government agreed to consider a recommendation to incorporate the requirements of the Aboriginal and Torres Strait Islander Heritage Protection Act 1984 into the EPBC Act.

Australian Safeguards and Non-Proliferation Office (ASNO)

The principal focus of ASNO is on international and domestic action against the proliferation of weapons of mass destruction – nuclear, chemical and biological – and also radiological weapons. Thus its work is related directly to international and national security.

ASNO is responsible for ensuring that Australia's obligations under the Non-Proliferation Treaty, Australia's safeguards agreement and Additional Protocol with the International Atomic Energy Agency (IAEA), the Convention on the Physical Protection of Nuclear Material (CPPNM) and Australia's various bilateral nuclear cooperation agreements are met.

ASNO is responsible for implementing the treaty requirements as they relate to uranium mining and associated transport. This includes the facilitation of inspections at uranium mines conducted by the International Atomic Energy Agency (IAEA) and domestic inspections conducted by ASNO.

ASNO's responsibilities cover uranium, thorium and plutonium, and its legislation applies to all persons or organisations in Australian jurisdiction having relevant materials, equipment or technology, or conducting associated nuclear activities. Australia's uranium export policy acknowledges the strategic significance which distinguishes uranium from other energy commodities.

Australian policy has consistently recognised that special arrangements need to be in place to regulate the uranium industry within Australia and to ensure exported uranium is only used for peaceful purposes.

ASNO issues permits to possess, transport and store nuclear material (including uranium ore concentrates produced by uranium mines) within Australia, and to establish and decommission certain nuclear facilities. Permits are granted by the Foreign Affairs Minister (or delegate) pursuant to the *Nuclear Non-Proliferation (Safeguards) Act 1987* (Cwth). Essentially, the purpose of this legislation is to ensure effective accounting, control and security of nuclear materials and associated items within Australia and to ensure Australia's international treaty requirements can be met.

These permits control, inter alia, the transfer of nuclear material and require approval to be sought by exporters for each shipment of uranium to ensure that the required safeguards will be applied by importing countries. ASNO informs DRET when safeguards assurances have been granted, and when security requirements are being met, at which point DRET can issue a shipping approval.

The establishment and decommissioning of uranium mines requires permits to ensure that procedures for the implementation of safeguards and adequate physical security can be applied. Any transport of uranium within Australia requires a permit to transport nuclear material.

Each transporter of uranium in Australia must also submit a transport plan to ASNO. A transporter may wish to submit a single transport plan, detailing all the stages of

the transport process (transportation from mine site, to storage site, to port, to overseas country); or submit individual transport plans for each stage of the transport process. Transport plans may be submitted either by the producer (the mine) or by the transporter (carrier), but in any case must be adopted by the transporter.

Australia's requirements for the export of uranium include:

- Australian uranium may only be exported to countries that are a party to the Nuclear Non-Proliferation Treaty (with India exempted¹⁰) and that have a bilateral nuclear cooperation agreement with Australia which gives assurance that Australian-Obligated Nuclear Material (AONM) will only be used for peaceful, non-explosive and non-military purposes
- AONM must be subject to International Atomic Energy Agency (IAEA) safeguards, and an IAEA Additional Protocol (provides for strengthened safeguards) must be in force in the recipient country.
- fallback safeguards in the event that IAEA safeguards no longer apply for any reason
- the requirement for prior Australian consent for any transfer of AONM to a third party, for any enrichment beyond 20 per cent of uranium-235 and for reprocessing of AONM
- the application of international standards of physical security to all AONM
- commercial contracts for the export of Australian uranium must include a clause noting that the contract is subject to the relevant bilateral nuclear cooperation arrangement (monitored by DRET)
- customer countries are responsible for management of waste and other products from the use of Australian uranium in their nuclear power reactors.

The current four operating mines in Australia all have an export permission. Export permissions are typically subject to stringent conditions, requiring, for example, copies of export contracts to be provided to DRET prior to shipment, safeguards clearances for each shipment and reporting requirements.

Every individual shipment of uranium leaving Australia must have prior approval from the DRET, ASNO and Customs before it can leave the country and a tracking system is in place for every stage of the process. Post export monitoring includes the need for a converter reconciliation report to be filed biannually regarding the balances of uranium and reporting of what has been delivered to a conversion facility in the relevant country.

If, at any stage, the Australian Government or its regulating bodies believe that there has been a breach in the export permit conditions or an unlawful use of uranium, the relevant export permit may be revoked.

ASNO is responsible for the implementation of the Uranium Producers Charge under the *Nuclear Safeguards (Producers of Uranium Ore Concentrates) Charge Act 1993*. This charge was introduced to recover some of the costs of ASNOs activities, and is payable to the Federal Government on each kilogram of uranium ore concentrate production, which in 2010-11 was set to 10.3077 cents per kilogram.

¹⁰ In relation to India, the Australian Government notes that commitments and responsible actions in support of nuclear non-proliferation, consistent with international guidelines on nuclear supply, will provide an acceptable basis for peaceful nuclear cooperation, including the export of uranium, subject to the application of strong safeguards.

Australian Maritime Safety Authority

AMSA is established under the *Navigation Act 1912* and develops subordinate legislation (Marine Orders), which are equivalent to Regulations for other types of legislation.

Radioactive cargoes are classified as Class 7 Dangerous Goods. They are transported by sea under the provisions of Marine Orders Part 41 – Carriage of Dangerous Goods, Issue 10; (MO 41). MO 41 provides legal effect for the International Maritime Dangerous Goods (IMDG) Code which contains the classification (Chapter 2.7), as well as packaging, packing, marking, separation/segregation and documentation requirements for all dangerous goods, with provisions in each of those sections specific for Class 7 cargoes.

In effect the IMDG Code replicates International Atomic Energy Agency (IAEA) provisions for classification and packaging, so it is mainly the separation/segregation requirements for ships which are specific.

Australian uranium oxide is packaged to comply with, and generally to exceed, all applicable national and international requirements. The method used by Australian producers is approved for sea transport by AMSA in accordance with the IMDG Code. UOC is packed in sealed 200 litre steel drums meeting IP-1 (industrial package) standards as required by the IAEA safety standards.



Each drum has a tight fitting lid which is secured to the drum with a steel locking ring that is clamped by a locking ring bolt. Drums filled with UOC are stowed securely within 20 foot International Organisation for Standardisation (ISO) sea freight containers (or cargo transport units (CTUs)) to international standards using a webbed Kevlar-based strapping system to withstand the G-forces expected during road, rail and sea transportation and associated handling operations. This arrangement for securing the drums in the CTU was developed by Loadsafe Australia Pty Ltd and is approved by AMSA for sea transport.

The UOC effectively has double encapsulation or 'wrap' protection, consisting of an inner sealed container (the drum) within an outer shipping container. The filled drums are marked and the containers are packed and placarded to comply with transport requirements. The containers are then inspected and radiation levels measured and recorded before being sealed with consecutively numbered security seals affixed to the door of each container at the mine site. Container seals are checked for integrity at all trans-shipment and discharge points. This verifies that containers remain sealed throughout the journey from mine to final overseas point of delivery.

The securing and stowage position of CTUs on the vessel is also required to comply with the IMDG Code, to AMSA satisfaction. All Australian UOC transported by sea is stowed under deck, generally with the doors facing each other to minimise the opportunity for the container doors to open should some external event trigger a significant force or impact upon the containers during transport. These packaging

requirements greatly reduce the likelihood of there being an event which could lead to a spill.

Shipments of UOC are also required to be accompanied by transport documentation meeting the requirements set out in the IMDG Code, usually in the form of a Multi-Modal Dangerous Goods Form, acceptable for all modes of transport.

Shipping routes

Currently Adelaide and Darwin are the only points of export for uranium oxide (Class 7 cargo). Darwin port is currently limited to servicing 'charter' shipments to China.

In relation to domestic land transport for mine site to load port, major national road transport companies are utilised by all uranium oxide consignors in Australia. ERA utilises the Darwin to Adelaide railway link for exports to North America and Europe.

Attorney-General's Department

Native Title

Consideration of Native Title matters is not specific to uranium exploration and mining but may apply as for any development activity. The *Native Title Act 1993* (Cwlth) (NT Act) provides a legislative regime for negotiating with Native Title parties before the state can grant any mining or exploration tenures. Such negotiations may involve Indigenous Land Use Agreements (ILUAs) or the statutory right to negotiate process.

The NT Act allows, subject to Australian Government approval, each state or territory to develop its own set of procedures for negotiating with Native Title holders in respect of mining and exploration.

The right to negotiate

Native Title claimants have the right to negotiate about some proposed developments over land and waters if their application satisfies the registration test conditions. The right to negotiate only applies to certain types of future acts, such as the granting of exploration licences and mining leases. The right to negotiate does not give Native Title claimants the power to prevent a future act being done.

The National Native Title Tribunal (NNTT) administers the future act processes that attract the right to negotiate. For some future acts, there may not be a right to negotiate but other rights may be available. These are usually administered by state and territory governments and the NNTT is not generally involved.

In Queensland, most exploration permits that affect Native Title are issued using the expedited procedure, which means that the right to negotiate only applies if a claim group grounds a successful objection in the NNTT. The operation of the expedited procedure in Queensland is unique in the sense that the tenements come with a set of conditions that serve to regulate the relationship between Native Title parties and explorers.

It is also possible for parties to negotiate an arrangement that is more tailored to individual projects than the pre-set conditions.

Indigenous Land Use Agreements

The NT Act provides for ILUAs to be made between Native Title holders or claimants and other interested parties about how land and waters in the area covered by the agreement will be used and managed in the future.

Once an ILUA is authorised by the Native Title parties, then signed by all parties, it is lodged with the NNTT for registration. After the ILUA is registered the authorised future acts may then proceed. Once an ILUA is registered with the NNTT it has the same status as a legal contract binding all Native Title parties to the terms of the agreement.

ILUAs are commonly used in Queensland to resolve Native Title issues. ILUAs registered in Queensland comprise over half of all ILUAs.¹¹

Australian Radiation Protection and Nuclear Safety Agency (ARPANSA)

The *Australian Radiation Protection and Nuclear Safety Act 1998* (ARPANS Act) has the objective of protecting the health and safety of people and the environment from the possible harmful effects of radiation. The Act also establishes the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA).

ARPANSA's functions include promoting uniformity of radiation protection and nuclear safety policy and practices across the federal, state and territory governments. This includes regulating radiation protection and nuclear safety aspects of all Australian Government entities involved in radiation or nuclear activities and dealings. It also includes monitoring compliance with prohibitions related to the regulation of controlled material, controlled apparatus and controlled facilities.¹²

Under the Act, the responsibility for establishing and maintaining national codes of practice for radiation in Australia is vested in ARPANSA. The Act also establishes the Radiation Health Committee, which includes a radiation control officer from each state and territory as a representative of that jurisdiction. The functions of the Radiation Health Committee are to develop, formulate and review national policies, codes and standards in relation to radiation protection.

The National Directory of Radiation Protection (NDRP) establishes the framework for radiation regulators across Australia and includes the Codes of Practice. These Codes of Practice are adopted by each jurisdiction within their existing legislative framework, and this applies to whichever agency leads on a particular issue i.e. radiation health, mining or occupational health and safety.

ARPANSA and the Radiation Health Committee (RHC) has a role in promoting national uniformity in radiation protection policy and practices across jurisdictions to be adopted nationally, including establishing and maintaining national standards, codes of practice and guidelines for radiation protection.

Four categories of publications are released by ARPANSA:

¹¹ 387 of 681 ILUAs as at 4 December 2012. NNTT, *Search the Register of Indigenous Land Use Agreements* (2012) NNTT Website < <http://www.nntt.gov.au/Indigenous-Land-Use-Agreements/Search-Registered-ILUAs/Pages/Search.aspx> > at 6 December 2012

¹² ARPANSA submission to House of Representatives Standing Committee on Industry and Resources, *Australia's Uranium – Greenhouse friendly fuel for an energy hungry world*, November 2006, p. 512.

1. Radiation protection standards set prescriptive fundamental requirements for safety and contain key procedural requirements regarded as essential for best international practice in radiation protection, and fundamental quantitative requirements, such as exposure limits.
2. Prescriptive codes of practice that contain practice specific requirements that must be satisfied to ensure an acceptable level of safety in dealings involving exposure to radiation.
3. Recommendations that provide guidance on fundamental principles for radiation protection. They are written in an explanatory and non-regulatory style and describe the basic concepts and objectives of best international practice.
4. Safety guides that provide practice specific guidance on achieving the requirements set out in Radiation Protection Standards and Codes of Practice. They are non-prescriptive, but may recommend good practices.

Specific documents in ARPANSA's radiation protection series and radiation health series¹³ that are taken into account for uranium mining include:

- *Recommendations for Limiting Exposure to Ionising Radiation (1995) and National Standard for Limiting Occupational Exposure to Ionising Radiation (republished 2002)*, RPS 1
- *Code of Practice for the Safe Transport of Radioactive Substances (2008)*, RPS 2
- *Code of Practice and Safety Guide for Radiation Protection and Radioactive Waste Management in Mining and Mineral Processing (2005)*, RPS 9
- *Safety Guide for Monitoring, Assessing and Recording Occupational Radiation Doses in Mining and Mineral Processing (2011)*, RPS 9.1
- *Code of Practice and Safety Guide for Safe Use of Fixed Radiation Gauges (2007)* PRS 13
- *Code of practice for the safe use of sealed radioactive sources in borehole logging (1989)*, RPS 28
- *Code of practice for the near-surface disposal of radioactive waste in Australia (1992)* RHS 35.

ARPANSA administers Australia's rights and obligations under the Joint Convention on the Safety of Spent Fuel Management and the Safety of Radioactive Waste Management which was ratified by Australia in 2003, and the Convention on Nuclear Safety which was ratified by Australia in March 1997. All jurisdictions have signed up to these conventions.

ARPANSA's radiation protection series publications are based on the IAEA radiation protection framework, representing best practice drawing from the many documents in the IAEA technical and safety series¹⁴ relevant to best practice radiation protection in uranium mining and milling.

International Commission on Radiological Protection (ICRP)

The radiation protection standards specified by ARPANSA are based upon recommendations made by the International Commission on Radiological Protection (ICRP). Since 1928, ICRP has developed, maintained, and elaborated the International System of Radiological Protection used internationally as the common basis for radiological protection standards, legislation, guidelines, programmes and practice.

¹³ <http://www.arpansa.gov.au/Publications/codes/rps.cfm>.

¹⁴ <http://www-ns.iaea.org/publications/information.asp?s=5&l=36>

The system has been developed based on the current understanding of the science of radiation exposures and effects and value judgements. These value judgements take into account societal expectations, ethics, and experience gained in application of the system.

The ICRP is an independent, international organisation with more than 200 volunteer members from approximately 30 countries. These members represent the leading scientists and policy makers in the field of radiological protection and they carry out their work through five committees covering the principal issues associated with radiation protection. ICRP is funded through a number of ongoing contributions from organisations with an interest in radiological protection. At any one time, there are usually several Australian experts serving on the ICRP committees.

International Atomic Energy Agency (IAEA)

Australia is a member state of the International Atomic Energy Agency (IAEA). The IAEA develops international regulatory systems and conventions to build and strengthen the international safety and security regime.

The IAEA is the world's centre of cooperation in the nuclear field. It was set up as the world's Atoms for Peace organisation in 1957 within the United Nations family. The Agency works with its member states and multiple partners worldwide to promote the safe, secure and peaceful use of nuclear sciences and technology.

The programs of the IAEA encourage the development of the peaceful applications of nuclear technology, provide international safeguards against misuse of nuclear technology and nuclear materials and promote nuclear safety (including radiation protection) and nuclear security standards and their implementation.

Waste management

The management of tailings and waste rock usually occurs on a site-by-site basis, depending on the type of mining operation, and is typically covered under relevant state and territory mining acts, but also forms an important part of the Australian Government's environmental legislation.

The Code of Practice and Safety Guide for Radiation Protection and Radioactive Waste Management in Mining and Mineral Processing (2005) provides guidance to state and territory governments in regulating uranium mining including the radioactive wastes arising from the mine. The related *Code of Practice for Disposal of Radioactive Wastes by the User (1985)* is only for relatively low levels of radioactivity, or radionuclides of short half-life, such as are generated by many current medical, industrial and research uses of radioactivity in Australia.

The *Code of Practice for the Near-Surface Disposal of Radioactive Waste in Australia (1992)* could be used in exceptional circumstances such as the rehabilitation of abandoned mines where small amounts of tailings or other contaminated materials are involved.

Other relevant bodies and agencies

Australian Nuclear Science and Technology Organisation

ANSTO Minerals is the leading process development facility in Australia with significant expertise in the leaching and processing of uranium ores. The group has

carried out studies for Australia's main operating sites including Mary Kathleen, Nabarlek, Olympic Dam, Ranger and the Beverley Mine. It has also undertaken development work on many other deposits, including Koongarra, Jabiluka, Valhalla, Yeelirrie, Westmoreland, Lake Way, Kintyre, Honeymoon, Four Mile, Crocker Well, Mulga Rock and Bigryli.

Projects range from optimisation of processing conditions, to managing the environmental impact of uranium processing. ANSTO Minerals capabilities in the field of uranium processing include a range of laboratory and pilot plant studies.

ANSTO also offers radiation safety training courses on a commercial basis to a range of industries including the minerals sector.

Uranium Council

DRET provides secretariat support to the Uranium Council, an industry and government forum established to contribute to national wellbeing through the progressive and sustainable development of the Australian uranium exploration, mining, milling and exporting industry in line with world's best practice standards.

The Council is pursuing the following objectives:

- progressing constructive and compatible changes to the basic legislative and policy framework for the sustainable development of the industry to ensure a consistent and effective regulation regime for uranium mining operators
- facilitating the economically competitive development of the industry
- improving coordination and, where appropriate, the consistency of policy regimes
- encouraging new and expanded investment in competitive uranium development opportunities
- providing an opportunity for information and policy exchange on issues affecting the uranium industry.

The Council comprises representatives of the Australian Government, state and territory government agencies, industry and non-government organisations. The Council meets formally once a year with venues rotated between participating jurisdictions. Under the guidance of the Council, recent initiatives include the Australian National Radiation Dose Register, principles and guidelines for stakeholder engagement, the uranium transport strategy and work to collate existing data on radiological protection of non-human biota in Australian mining environments.

The participation of Queensland on the Uranium Council ensures that Queensland interests are taken into account when developing national safety, health and environmental standards. It facilitates agency technical officers' involvement in the working groups and increases agency knowledge and understanding of related issues. It also establishes contacts with relevant officials from the other states and the Australian Government.

Industry programs

DRET manages three programs of interest to the broader mining sector. Queensland Government agencies and resources stakeholders have been actively involved in these initiatives and they may be relevant and of interest to stakeholders in the Queensland uranium industry in the future.

- **Leading Practice Sustainable Development Program for the Mining Industry (LPSDP)**

A program that promotes sustainable development and industry self-regulation through proactive adoption of leading practice principles.

The LPSDP provides practical guidance to the mining industry through handbooks and workshops. Such resources assist with the implementation of leading practice, and offer the mining industry and other stakeholders the opportunity to improve their social and environmental performance¹⁵.

- **Working in Partnership Program (WIP)**

Aims to support and encourage cultural change in relations between Indigenous communities and the mining industry, and promote long-term, effective partnerships which benefit all stakeholders. Building effective long-term relationships with Indigenous communities is now part of core business for the resources industry.

WIP is part of the Australian Government's commitment to increase opportunities for Indigenous Australians, noting that the resources sector is one of the few providing employment and business development opportunities for remote communities.¹⁶

- **Digedi**

An Indigenous Business Services Directory for Indigenous businesses capable of supplying goods and services to the resources and construction sectors. The Queensland edition of Digedi was launched in 2009 and currently contains nearly 80 businesses.¹⁷

3.4 States and territories

As stated, the day-to-day regulation of uranium mining activities is a responsibility of state and territory governments. State regulations encompass matters including health, safety and the environment. All three Australian jurisdictions currently permitting mining of uranium have in place extensive statutes regulating the granting of mining tenements and approvals of environmental management and radiation safety management associated with uranium exploration and mining.

Equally, each jurisdiction must operate in accordance with Australian Government requirements, and in general adopt the key Australian Government and international codes, practices and guidance already discussed.

It is not the Committee's intention to provide a comprehensive account and analysis of regulatory and approval systems in South Australia, the Northern Territory, Western Australia or internationally. The report only raises key elements of other uranium regulatory systems, focusing on similarities and differences and reflecting on general strengths, weaknesses and lessons.

Various Committee members participated in site visits and meetings within all three jurisdictions where uranium mining is permitted or currently being undertaken (the Northern Territory, South Australia and Western Australia). Summary accounts of the Committee's experiences and observations are provided in Appendix C.¹⁸

¹⁵ see www.ret.gov.au/sdmining

¹⁶ see www.ret.gov.au/indigenouspartnerships.

¹⁷ see www.digedi.com.au.

¹⁸ A thorough account of regulatory and approval frameworks in other jurisdictions can be found in a 2012 report prepared by the Uranium Advisory Group comprised of the University of Western Australia, CSIRO and Curtin University: Independent Review of Uranium Mining Regulation, 2012 (UAG) DMP0281009-A.

Western Australia

Western Australia has over 40 years' experience in regulating mineral sands projects which involve radioactive products. However, the relevant government agencies do not have the same contemporary operational experience in regulating uranium mines as Northern Territory and South Australia, as there has been no opportunity.

In Western Australia, there is a lead agency approach to all mining regulation for all mines, in which radiation protection is covered (the Department of Mines and Petroleum is the lead agency for uranium mining). These arrangements do not preclude the regulatory involvement of other state agencies, but it does provide an overarching framework for the regulatory system.

Uranium mine operators in Western Australia require a minimum of twelve state approvals (in addition to three Australian Government approvals), as follows:

- mining lease under the *Mining Act 1978* that considers the results of a mineralisation report and satisfactory resolution of Native Title matters
- approval under the *Environmental Protection Act 1986* (for environmental impact assessment under Part IV)
- mining proposal approval under the *Mining Act 1978* before constructing and operating a mine and a mill
- works approval and a licence as required in Schedule 1 of the *Environmental Protection Regulations 1987* before constructing and operating a mine and a mill
- registration and licence for the mining and milling of radioactive substances, under the *Radiation Safety Act 1975* which includes the approval of a Radiation Management Plan and a Radioactive Waste Management Plan
- licence (of operator) for the transport of radioactive substances (including uranium concentrate) under the *Radiation Safety Act 1975*
- licence for the drilling of well holes and extraction of water resources and a permit to interfere with the beds and banks of a watercourse under the *Rights in Water and Irrigation Act 1914*
- two approvals under the *Mines Safety Inspection Act 1994* by the State Mining Engineer (for a project management plan and a radiation management plan) before commencing mining operations
- environmental approval under the EPBC Act (Cwlth)
- permits to possess and transport uranium ore concentrates under the *Nuclear Non-Proliferation (Safeguards) Act 1987*
- licence issued under the *Customs Act 1901* (Cwlth) to export uranium concentrate.

One important government policy in Western Australia is that the export of uranium will not be permitted through any Western Australian port surrounded by residential development.

South Australia

Generally, the Minerals and Energy Resources Division of the Department of Manufacturing, Innovation, Trade, Resources and Energy (DMITRE) and the Radiation Protection Division of the South Australia Environment Protection Authority (SA EPA) are responsible for the day-to-day management of uranium mining, with the Australian Government playing a role in environmental assessment, export controls and management of proliferation risks.

The SA EPA has the primary responsibility for regulating radiation exposures to employees and public. Primary Industry and Resources of South Australia and SafeWork South Australia provide input into this through participation at quarterly technical radiation meetings with the companies. The quarterly radiation report is made publicly available either by the mining company from their own home page or in South Australia by the regulatory agency (SA EPA, 2010) following discussions at the Minesite Technical Committee meetings.

In addition to any Australian Government requirements under the EPBC Act, there are presently four state based approvals required to mine uranium in South Australia. They are a mining lease, a licence to mine and mill radioactive ores, a permit for the drilling of well holes and an environmental approval. As conditions of the mining lease, operators are required to produce a Mining and Rehabilitation Program (MARP). The environmental issues, which should be addressed by the MARP, are based on risk on a case-by-case basis. Companies are required to submit Mining and Rehabilitation Compliance Reports annually to ensure compliance with the requirements of the MARP and lease conditions.

Operators of South Australia's operational uranium mines are also required to submit to the responsible Minister an environment management and monitoring plan. This is a plan for protecting, managing and rehabilitating the environment affected by the mining. It encompasses waste management, flora, fauna, groundwater spills and air emissions.

The Olympic Dam uranium mine site is also subject to specific legislation, dealing exclusively with that mine site. The *Roxby Downs (Indenture Ratification) Act 1982* (Indenture Act) sets out provisions specific to that site including areas such as royalties, the right to draw water and the provision of government infrastructure and services.

Northern Territory

A Memorandum of Understanding (MOU) between the Australian Government and the Northern Territory Government in relation to working arrangements for the regulation of uranium mining in the Northern Territory defines the roles and responsibilities of each jurisdiction in relation to uranium mining. The Northern Territory Government retains responsibility for day-to-day regulation of mining, albeit in close consultation with the Supervising Scientist Division (SSD). This applies to operations within the Alligator Rivers Region which include the currently operating Ranger mine, the decommissioned Nabarlek mine and the Jabiluka uranium deposits.

Legacy issues and the resultant legislation structure in the Northern Territory have created a dual responsibility for uranium mining between the Northern Territory and the Australian Governments. The grant and operation of a mining interest in respect of uranium (and other prescribed substances) is subject to territory law, but in exercising discretion pursuant to that law the territory minister must abide by the wishes of the federal minister in relation to the granting of a mineral lease.

In effect, the Northern Territory Government is the day-to-day regulator of uranium mines, with the Australian Government's role limited to providing advice on the granting of leases. The other Australian Government role is in relation to ensuring there is no impact on the environment from uranium mines in the Alligator Rivers Region through SSD.

Royalties from uranium mining at the Ranger mine as per the Ranger Government Agreement are payable to the Australian Government, which then reimburses a

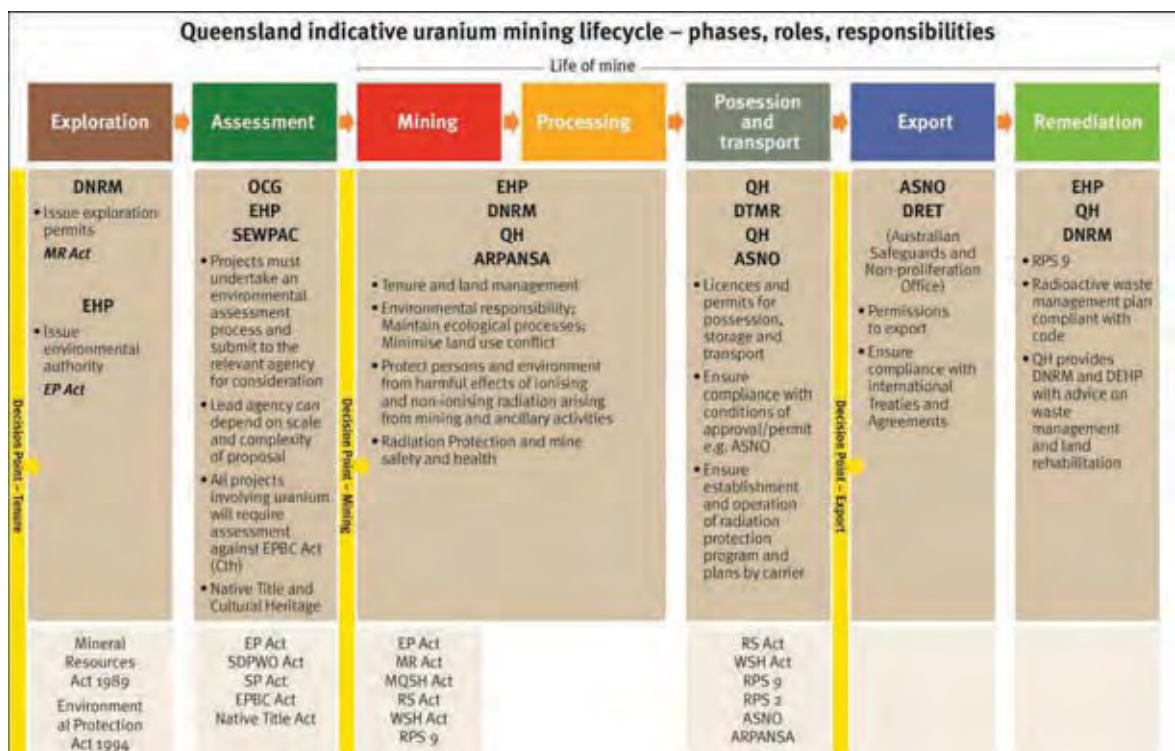
proportion to the Northern Territory Government. In addition, as the mine is on Aboriginal land, the remainder of royalties are paid into the Aboriginal Benefits Account for payment to parties including the Traditional Owners.

The *Environment Protection (Alligator Rivers Region) Act 1978* is aimed at providing environmental protection in the area defined as the Alligator Rivers Region, containing the Ranger, Jabiluka, Koongara and Nabarlek mineral leases. Under the Act, the OSS was established to undertake environmental oversight of uranium mining. It also extended the functions of the Supervising Scientist to the provision of scientific and technical advice outside the region. In the Northern Territory, the Department of Resources coordinates quarterly technical meetings, in which the OSS and the Northern Land Council participate.

Queensland

The Queensland regulatory regime and approvals process for mining in general has accommodated industries associated with the mining of radioactive materials (such as mineral sands and tantalum) for a number of decades. By default, Queensland's existing regulatory framework for the mining industry has applied, and will continue to apply, to uranium mining activities. It is essentially the same framework with the addition of laws governing radiation protection and specific export restrictions (see Box 3.3).

Box 3.3 Queensland regulatory and approvals framework applying to uranium exploration and mining



To date, the main rationale for this is likely to be the assertion that in practice, mining uranium is little different to the mining of other metalliferous minerals. The usual administrative processes within government can be applied and are suffice regardless of the mineral type.

With the exception of the unique feature of uranium – its low level of radioactivity – its mining involves extraction and processing of ore with extraction technologies that are very similar to extraction technologies for other minerals. Processing of uranium ore into uranium oxide is both similar to the processing of other base metals in that

it involves a series of activities to separate the product for export from the natural ore. The difference is that the processing of uranium oxide uses mineral specific and site specific processing technologies, as does the processing of other base metals.

Broadly, the regulatory and approval steps for a uranium mining proposal under Queensland's current resource industry regulation would include the following general steps:

1. Exploration investment
 - preliminary environmental, Native Title, cultural heritage requirements
 - acquisition of exploration tenure and permits.
2. Resource development
 - Mineral development licence (time limited and not always sought).
3. Mining, processing and to market
 - application for mining lease
 - assessment of detailed environmental (state and federal), Native Title, cultural heritage, mine plan etc.
 - grant of Environmental Authority (EA) and mining tenure
 - mine safety and health requirements
 - radiation safety and protection requirements
 - mining and payment of royalties
 - uranium oxide possession, storage, transport and export permissions.
4. Mine closure and remediation requirements.

Exploration activities

Uranium exploration has been permitted in Queensland for some time and is currently governed by the following key statutes and regulations:

- a) *Mineral Resources Act 1989* (MR Act) and *Mineral Resources Regulation 2003* (Qld)

The MR Act provides the regulatory and administrative framework for the grant of uranium exploration approvals and management of uranium exploration activities in Queensland. Uranium falls within the definition of 'mineral' in section 6 of the MR Act. Therefore, proponents seeking to explore for uranium would require an exploration permit for minerals (EPM). It is administered by DNRM.

- b) *Environmental Protection Act 1994* (EP Act) and *Environmental Protection Regulation 2008* (Qld)

The EP Act provides the regulatory framework and licensing requirements to protect the environment from damage associated with uranium exploration activities. It is administered by the Department of Environment and Heritage Protection (EHP).

- c) *Mining and Quarrying Safety and Health Act 1999* (Qld) (MQSH Act) and *Mining and Quarrying Safety and Health Regulation 2001* (Qld)

The MQSH Act governs the operation of uranium exploration activities to protect the safety and health of operating personnel and persons who may

be affected by uranium exploration operations. It is administered by the DNRM through the Mines Inspectorate.

d) *Radiation Safety Act 1999 (Qld) (RS Act) and Radiation Safety Regulation 1999 (Qld)*

The RS Act governs the licensing and handling of radioactive substances (including uranium) and is administered by the Queensland Health through Radiation Health.

Uranium exploration activities in Queensland are also subject to the variety of codes and guidelines which implement Australian Government requirements imposed under the *Australian Radiation Protection and Nuclear Safety Act 1998 (Cwlth)* (ARPANS Act) and national standards that are prepared by ARPANSA, for example, *Guidance Note QGN12 – Radiation Protection from Naturally Occurring Radioactive Materials During Exploration* prepared by DNRM and Queensland Health.

Production

In the absence of legislating any additional measures, the above key statutes, regulations, and Australian Government requirements - specifically in regards to the *Nuclear Non-Proliferation (Safeguards) Act 1987 (Cwlth)*; ARPANS Act; *Environment Protection and Biodiversity Conservation Act 1999 (Cwlth)* (EPBC Act); and the *Customs (Prohibited Exports) Regulations 1958 (Cwlth)* - would equally apply to any uranium mining production occurring in Queensland.

In this context, the following approvals would be required under the existing regulatory framework in order to conduct uranium mining operations in Queensland:

- a mining lease for uranium under the MR Act
- an EA and associated federal and state approvals under the EP Act and EPBC Act
- the appointment of a mine operator and site senior executive and the implementation of a safety and health management system in accordance with the MQSH Act
- a licence to possess a radioactive source and approval of a radioactive source security plan under the RS Act
- a licence to transport a radioactive source and approval of a transport security plan under the RS Act
- approval of a radioactive safety and protection plan and granting of a certificate of compliance in relation to storage and possession sites under the RS Act
- appointment and certification of a radiation safety officer under the RS Act
- permits to possess and transport uranium under the *Nuclear Non-Proliferation (Safeguards) Act 1987 (Cwlth)*
- an export permission issued under the *Customs Act 1901 (Cwlth)*.

Securing mining tenure and land access

The MR Act would be applicable for exploration tenure and production tenure for uranium since it governs exploration, development and mining. The types of mining tenures granted and administered include exploration permit, mineral development licence, and mining lease.

The Act and associated Regulation captures the mining tenure application process, consideration of resource viability, landholder compensation, Native Title, land

access, royalties and rental payments, and subsequent compliance requirements such as reporting.

- **Land access**

It is a condition of a resource tenure (with the exception of mining leases) that resource companies must comply with the land access laws. The land access laws set the framework for a staged notification and negotiation process that resource companies must follow in order to access and undertake activities on private land.

Under these laws, all resource companies must comply with the statutory Land Access Code. The Land Access Code provides best practice guidance for good relations and communications and sets mandatory conduct conditions for resource companies on private land. Some of the mandatory conditions include minimising disturbance to people, livestock and property and taking reasonable steps to prevent the spread of declared pests.

The land access laws also provide a framework for landholders to be compensated for any significant impact they experience to their land and/or business as a direct result of resource activity on their land. Further information on compensation and the current statutory mechanisms that are in place to protect agricultural land and landholders is provided in Chapter 7 of this report.

Strictly speaking, at the mining lease stage the land access framework is not directly applicable, albeit it still provides valuable guidance for proponents. In practice before a mining lease is granted, Section 279 of the MR Act requires that compensation has been determined with the owner of the land.

Environmental considerations

A key element of the overarching regulatory framework in Queensland is its environmental approvals which are separate from, but necessary for the issuing of mining tenure approvals. Environmental approvals are addressed under the EP Act.

Environmental management and regulation of the mining industry is administered by the administering authority through the provisions of the EP Act. The EP Act provides for the assessment, decision making and issuing of EAs for mining and enforcement of the conditions of the EA. An EA will encompass assessment, approval and management of any environmental impact from the construction and operation of a mine and/or mill. The EA also requires the periodic approval of a Plan of Operations.

- **Environmental authorities**

A uranium mine is a resource activity under section 107 of the EP Act and requires an EA. The primary role of the EA is to set obligations (conditions) that must be complied with when carrying out the resource activity. The matters which conditions can be set for under the EP Act are very broad and adequate to address any potential impacts from uranium mining on environmental values. Conditions of EAs can also include requirements for monitoring and financial assurance to ensure a mine is not abandoned without proper rehabilitation.

EAs generally have an associated annual licence fee. Currently there is no specific annual licence fee for a uranium mine and this should be addressed prior to receiving applications for uranium mines.

An application for an EA can be a standard application, a variation application or a site specific application. A standard application (s. 122 of the EP Act) is for low risk activities that meet eligibility criteria under the EP Regulation and are able to comply with standard conditions. A variation application (s. 123 of the EP Act) is for activities that meet eligibility criteria under the EP Regulation but require variation of one or more standard conditions. It is not expected that uranium mines would be assessed as standard or variation applications, but rather assessed as site-specific applications.

Site specific applications (s. 124 of the EP Act) are for activities that cannot meet the eligibility criteria of the EP Regulation and are determined to have a medium to high environmental risk. Site specific applications must include enough information (such as a description of the proposed project and the likely environmental impacts) to allow the administering authority to make a decision as to whether an EIS is required. Site specific environmental management documents that propose relevant environmental protection commitments would be required before an application is assessed.

It is considered that uranium mines are likely to be assessed as site-specific applications and will require an environmental impact statement (EIS) either:

- under the EP Act
- because they were declared a significant project by the Coordinator-General
- it is determined to be a controlled action by the federal Minister for the Environment.

- **Project authorities**

A mining project is defined under the EP Act as all mining activities carried out, or proposed to be carried out, under one or more mining tenements, in any combination, as a single integrated operation. When a mining project includes more than one tenement, the administering authority will issue a project authority to cover all activities on all tenements.

Activities that are not authorised by the MR Act (because they are not prospecting, exploration or mining) to take place under the tenement must comply with the requirements of the *Sustainable Planning Act 2009* (SP Act).

- **Plan of operations**

Under the EP Act, a plan of operations must be submitted to the administering authority by the holder of an EA at least 28 days, or a shorter period as agreed by the administering authority, prior to carrying out any activities on a mining lease.

A plan of operations describes the actions and programs to achieve compliance with the conditions of an EA for mining activities. It may apply to two or more relevant mining leases and may cover a period up to five years. All activities carried out under the relevant mining lease must be carried out in accordance with the submitted plan of operations.

- **Financial assurance**

Under the EP Act, the administering authority may require a financial assurance to be lodged as a condition of an EA. A financial assurance is required for all mining tenements except prospecting permits. The financial assurance is held as security for complying with the conditions of an EA and is based on third party costs to rehabilitate land that is disturbed as a result of the mining project.

Applicants will be required to lodge a single financial assurance with DNRM. This amount may consist of the security deposit required under the MR Act and the financial assurance under the EP Act. The financial assurance must be lodged prior to carrying out activities on the site. The administering authority will decide, in accordance with the guideline *Calculating Financial Assurance for Mining Projects (EM585)* what form of financial assurance is considered appropriate. For example, a financial assurance may be lodged in the form of cash or a bank guarantee.

- **Surrenders and residual risk payments**

The EP Act requires a final rehabilitation report (FRR) and audit statement (AS) to accompany applications for the surrender of all or part of an EA for a mining project. A progressive rehabilitation report (PRR) and an AS is required to accompany applications for progressive certification for a mining tenement. The contents of an FRR include:

- project details
- extent of the application surrender, i.e. whole project or part of the project
- a status report outlining the final rehabilitation outcomes, compliance with commitments and regulatory requirements, requirements and costs for ongoing remediation, rehabilitation as well as monitoring and maintenance
- a contaminated land assessment.

Every application for progressive certification of an area within a uranium mining lease project would require a report on the results of an environmental risk assessment conducted in accordance with the guideline *Calculating Financial Assurance for Mining Projects (EM585)*. This report must:

- describe the environmental risk assessment of the subject area(s) and how it relates to the methodology described in the above guideline
- provide an estimation of the monitoring costs that are needed to assess the probable changes within the subject area(s)
- provide an estimation of third party maintenance costs that might reasonably be expected to be needed for the subject area(s) on an annual basis (and indicate the period over which maintenance is most likely to be required).

If the monitoring or maintenance program is predicted to continue for more than 30 years, the EA holder may be asked to provide additional justification of why the rehabilitation should be accepted as satisfactory.

A residual risk payment proposal is required as a component of the financial assurance for the mining project determined from the environmental risk assessment and expected ongoing costs to cover the monitoring and managing likely residual risks associated with the rehabilitation of the subject area(s).

A residual risk payment may be made by varying the bank guarantee for the project (if there is one) or may be a cash payment until the relevant mining tenements are surrendered.

Administrative agreements

There are a number of administrative agreements in place between the regulatory agencies administering the statutes to assist in streamlining the environmental impact assessment processes. These include:

- an MOU between EHP and DNRM in relation to the land approval process and environmental impact assessment of mining activities
- a bilateral agreement between the Queensland and Australian Governments on formal environmental impact assessment of proposals. The bilateral agreement provides two assessment processes relevant to uranium mining proposals in Queensland: an EIS assessment carried out under the EP Act or an EIS assessment carried out under the SDPWO Act.

Queensland coordinated project process

In Queensland, a project with one or more of the following characteristics may be declared a 'coordinated project' by the Coordinator-General¹⁹:

- complex approval requirements, imposed by a local, the state or the federal governments
- significant environmental effects
- strategic significance to a locality, region or the state, including for the infrastructure, economic and social benefits, capital investment or employment opportunities it may provide
- significant infrastructure requirements.

The Coordinator-General also considers other matters, such as the capacity of the proponent to undertake and complete the EIS for the project, in the declaration process.

The declaration is made under the *State Development and Public Works Organisation Act 1971* (SDPWO Act). There are two types of 'coordinated project' declaration: (i) requiring an EIS and (ii) not requiring an EIS. Before declaring a 'coordinated project', the Coordinator-General must be satisfied the appropriate environmental impact assessments will be carried out under other legislation (the EP Act).

A 'coordinated project' declaration does not imply government approval of, support for or commitment to the project in question. Rather, it means the project requires a rigorous and comprehensive environmental impact assessment, involving whole-of-government coordination.

A uranium mining project proposal could be declared a 'coordinated project' under this legislation and proceed via this process. Chapter 4 discusses the role of the Coordinator-General in the Queensland resources industry and possible role in the whole-of-government coordination, assessment, recommending (or refusing) project development applications, and conditioning of uranium mines in Queensland.

- **'Coordinated project' environmental impact statement**

If a 'coordinated project' has the potential to cause environmental, social or economic impacts, the project proponent must prepare an EIS. The EIS is prepared in accordance with the Terms of Reference for the EIS, and the EIS describes the current environment; the project's environmental impacts; and ways of avoiding, mitigating or offsetting these impacts. The impacts include direct, indirect and

¹⁹ A proponent may also apply for the project to be a 'coordinated project'.

cumulative impacts resulting from the construction, commissioning, operation and decommissioning of the project.

The EIS process for coordinated projects involves several distinct steps:

- application (including initial advice statement)
- a 'coordinated project' declaration
- referral to Australian Government
- Terms of Reference
- EIS
- evaluation of EIS, including supplementary information and Coordinator-General report on the EIS, and other Australian Government approvals.

- **Advisory agencies**

The Coordinator-General coordinates the Queensland Government's evaluation of the project's EIS. A wide range of state government departments (known as 'advisory agencies') are responsible for reviewing the EIS (e.g. EHP). The EIS is also considered by relevant local councils and the Australian Government Department of Sustainability, Environment, Water, Population and Communities.

The public and state government advisory agencies are invited to make submissions on the EIS. State government advisory agencies and the public may also be invited to comment or make submissions on:

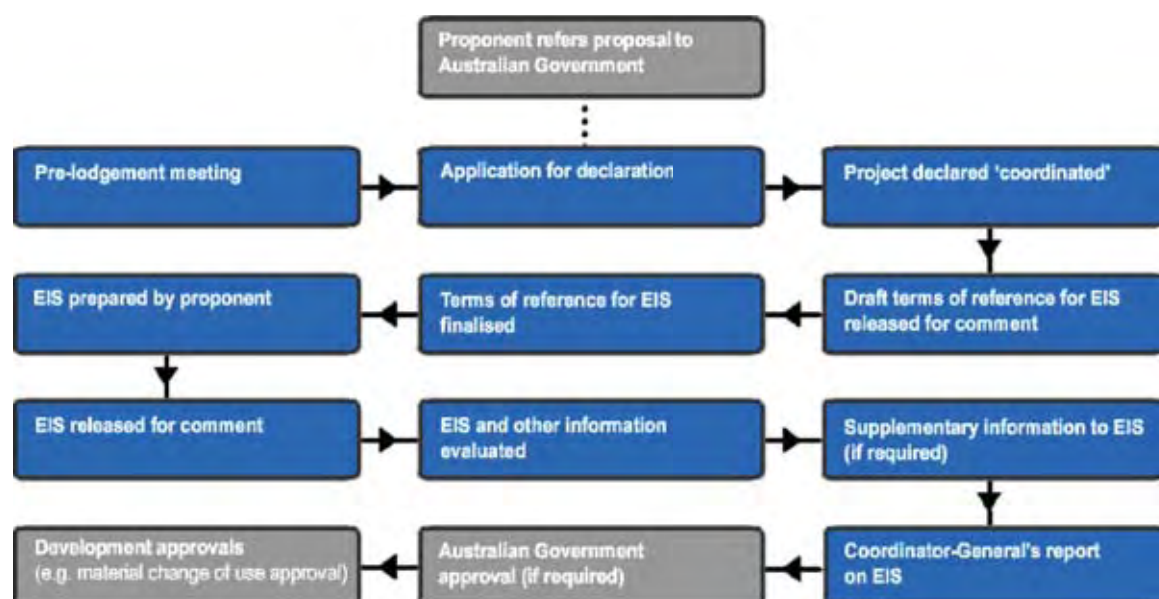
- the draft Terms of Reference for the EIS
- supplementary information to the EIS
- the application for project change

While a 'coordinated project' is undergoing an environmental impact assessment, the following are suspended:

- the Integrated Development Assessment System (IDAS) approvals process under the *Sustainable Planning Act 2009*
- approvals processes under other relevant Acts.

This suspension remains in place until the Coordinator-General's report on the EIS is completed and sent to the IDAS assessment manager and other assessment managers for their consideration.

Steps in the EIS process



- **Social impact assessment**

A social impact assessment is necessary for all resource development projects that require an EIS. The social impact assessment forms part of the EIS.

The social impact assessment process involves:

- understanding the local and regional areas potentially affected
- developing a stakeholder engagement plan
- scoping the social and cultural environment
- forecasting possible social changes
- developing a robust methodology
- estimating the significance of predicted changes
- identifying and managing potential impacts
- developing a monitoring plan to track implementation.

The assessment involves the collection of both qualitative and quantitative data. This data enables the existing, or baseline, social conditions to be measured and provides a basis for measuring future impacts.

The plan applies to the construction, commissioning, operation and the decommissioning of the project and describes:

- the project's potential (positive and negative) impacts
- mitigation and management strategies
- implementation actions
- roles and responsibilities of proponents, government, service providers and communities.

Among the social impacts and other issues the plan addresses are:

- stakeholder engagement
- workforce (training and employment)
- worker accommodation and housing
- health and community services.

The plan should be developed in consultation with government and community stakeholders.

Radiation protection, health and safety

In Queensland the prime legislative responsibility for all aspects of radiation safety associated with man-made radiation sources (including medical, research, industrial, sealed radioactive sources) lies with Queensland Health's Radiation Health Unit (Radiation Health). Radiation Health is a statewide program and, amongst other things, is responsible for:

- administering the *Radiation Safety Act 1999* including considering and deciding applications for licences, certificates and approvals made under the Act
- developing, implementing, enforcing, reviewing and evaluating Queensland's radiation safety and hygiene, security and control legislation, policy, standards and practice
- monitoring trends and providing professional counsel in all types of radiation activities such as in the mining and manufacturing industries, the health, allied health and veterinary industries, research and environmental protection
- providing specialist advice to emergency service providers in radiological emergencies

- assessing land contaminated with radioactive material and recommending to EHP whether such land should be listed on the environmental management or the contaminated land registers.

Regulatory requirements, functions and costs related to regulation of uranium mining under the <i>Radiation Safety Act 1999</i> (RS Act)		
Activity that may be regulated under the RS Act	Processing of uranium ore - if done outside a mining lease	Transport of uranium ore concentrate
Principle requirement	The operator of the processing plant must hold a possession licence for the uranium contained in the ore and the ore concentrate.	A person transporting uranium ore concentrate must hold a transport licence.
Consequential requirements	The possession licensee must: <ul style="list-style-type: none"> • have an approved radiation safety and protection plan (RSPP) • appoint a radiation safety officer (RSO) • comply with the <i>Code of Practice for Radiation Protection and Radioactive Waste Management in Mining and Mineral Processing (2005)</i> and under this Code the <i>Safety Guide for Monitoring, Assessing and Recording Occupational Radiation Doses in Mining and Mineral Processing (2011)</i>. 	The transport licensee must: <ul style="list-style-type: none"> • comply with the <i>Code of Practice for the Safe Transport of Radioactive Material (2008)</i> • have an approved radiation protection program (RPP) for transport
Regulatory functions	Regulatory functions include: <ul style="list-style-type: none"> • assessment of applications for possession licence and radiation safety officer certificates • assessment of radiation safety plans and waste management plans • monitoring compliance with the Act, approved RSPP, and Code • enforcement of breaches. <p>Note that all Australian regulators have agreed to adopt this Code into their regulatory frameworks. It is a requirement of this Code that regulators must audit compliance with the objectives of the Code.</p>	Regulatory functions include: <ul style="list-style-type: none"> • assessment of application for transport licence • assessment of radiation protection program • monitoring compliance with the Act, Code, and RPP • enforcement of breaches.

- **Queensland Radiation Advisory Council**

Under section 161 of the RSA, an independent Radiation Advisory Council (the Council) has been established in Queensland. The main object of the Council is to protect people and the environment from the harmful effects of particular sources of ionising and non-ionising of radiation.

The Council's role is to examine and make recommendations to the Health Minister about matters such as radiation, research into radiation practices carried out and the transport of radioactive materials in the state.

The Council supports the Queensland Government's health priorities by providing robust and expert independent advice and perspective on these matters. It has a critical role in ensuring the effective function of the RSA.

The Committee acknowledges the importance of the Council in Queensland. Future implementation of Committee recommendations by the Queensland Government should be cognisant of the Council's role and responsibility.

- **Mining safety and health**

There are health and safety risks that exist which are common to many mining operations. The health and environmental risks specific to uranium mining are related to exposure to ionising radiation:

- occupational exposure, either through direct exposure to radioactive material or inhalation of dusts containing radioactive particulates
- inhalation of radon gas (one of the radionuclides produced during the radioactive decay of uranium), public exposure to radioactive material released to the environment.

The specific ways in which these risks are dealt with depend on how the uranium is to be mined. For example exposure to radon gas is a greater risk in underground mines than it is in open-cut mines. The health and safety issues arising from exposure to radioactive minerals (including uranium ore and other Naturally Occurring Radioactive Materials (NORM)) are dealt with through the *Mining and Quarrying Safety and Health Act 1999* (MQSH Act), administered by DNRM.

Under the MQSH Act, the site senior executive must develop and implement a Safety and Health Management System, ensuring that the site controls risks from hazards (including those from radiation hazards) to an acceptable level. The MQSH Act specifies implementation of a risk management framework including hazard identification, risk analysis, risk reduction and risk monitoring. Under sections 10 and 11 for the MQSH Act, records of risk management must be kept by the mine executive in a risk management register. The *Mining and Quarrying Safety and Health Regulation 2001* requires adherence to the relevant national standard for the general exposure limit for ionising radiation.

Under the National Directory for Radiation Protection, as agreed to by the federal, state and territory governments, Australian regulators must, in their regulatory framework, adopt the *Code of Practice and Safety Guide for Radiation Protection and Radioactive Waste Management in Mining and Mineral Processing* (the Mining Code) published by the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA).

The purpose of the Mining Code is to provide a uniform framework for radiation protection in the mining and mineral processing industries (including uranium mining and processing), and for the safe management of radioactive waste arising from these activities. The Mining Code applies to the control of occupational and public radiation exposures, and the management of radioactive waste generated, at all stages of mining and mineral processing from exploration to final site rehabilitation.

The Mining Code requires that, before mining or processing activities commence, the operator must develop and obtain regulatory approval for a:

- radiation management plan
- radioactive waste management plan.

These plans are not prescriptive documents imposed by the regulator. They are documents developed by the operator that must be in accordance with best practicable technology and take account of potential radiation exposure pathways.

The radiation management plan should include:

- a description of the mining or processing operations, and measures to be taken to control the exposure of employees and members of the public
- a program for monitoring radiation exposure and for assessing occupational doses (This should be carried out in accordance with the *Safety Guide for Monitoring, Assessing and Recording Occupational Radiation Doses in Mining and Mineral Processing* - a supporting document under the Mining Code.)
- a plan for dealing with incidents involving exposure to radiation.

The radioactive waste management plan should include:

- a description of how radioactive waste is generated, the proposed system for waste management, and the environment into which waste may be discharged
- a program for environmental radiation monitoring and assessment of radiation doses to members of the public arising from the waste management practices
- contingency plans for dealing with uncontrolled releases of radioactive waste to the environment
- a plan for decommissioning the mining or processing operations and rehabilitating the site.

For uranium mine sites in Queensland, the Mining Code would be adopted through the *Mining and Quarrying Safety and Health Act 1999*. If processing of uranium ore were to take place outside of a mine site, the Mining Code would be adopted through the *Radiation Safety Act 1999*.

EHP is responsible for the environmental management performance of mining activities through the EP Act, regardless of whether the activities are on or off land subject of a mining lease, mineral development licence, or exploration permit. Radiation Health has an MOU with EHP which formalises the expectation that matters to be dealt with under the EP Act, which relate to radioactive materials will be dealt with by Radiation Health. Radiation Health has in the past provided advice to EHP about radiation related environmental matters associated with environmental protection, waste management, and land rehabilitation.

Transportation and export

The transport of uranium ore in Queensland would be applied through compliance with the *Code of Practice for the Safe Transport of Radioactive Material* (the Transport Code) published by ARPANSA. The Transport Code adopts the International Atomic Energy Agency Regulations for the safe transport of radioactive material, with slight modifications to suit Australia.

In Queensland the Transport Code is implemented through the licensing requirements contained in the *Radiation Safety Act 1999*. The Act requires a person transporting uranium ore to hold a transport licence. For transport by road

only an individual can hold the licence, for transport by rail the licence can be held by a company or an individual.

The Transport Code requires the establishment of a Radiation Protection Programme for the transport of radioactive material. This programme requires approval by Queensland Health as part of the licence application process.

The Transport Code covers the transport of a range of radioactive materials including bulk amounts of low activity material, small packages of medical isotopes, high activity industrial sources and spent fuel rods, through a range of means including rail, air, sea and road. It details packaging requirements, labelling requirements, emergency response, information to be given to carriers, test procedures and approval requirements for transport by road, rail, air and sea.

The Queensland *Radiation Safety Act* 1999 and Regulation (2010) imposes further regulation on material that falls within the definition of 'security enhanced source'. Material is a security enhanced source if the activity ratio is greater than or equal to one. If the material is a security enhanced source, the holder of a transport licence must have a transport security plan which meets the requirements of the Queensland Radiation Legislation and comply with the *Code of Practice for the Security of Radioactive Sources (2007)* published by ARPANSA.

In addition to this state based licence, a federal permit under the *Nuclear Non-Proliferation (Safeguards) Act 1987* (Cwlth) to transport the material is required.

As stated earlier, the Australian Government regulates the export of uranium in compliance with Australia's commitments under international laws applying to the nuclear industry and nuclear non-proliferation. Pursuant to the *Customs (Prohibited Exports) Regulations 1958* (Cwlth) export permissions are required from DRET.

3.5 International regulation of uranium mining²⁰

Exploration and mining of uranium resources has been undertaken around the world for many years and is now going on worldwide in over 30 countries. The majority of the world's production of uranium from mines is from Kazakhstan, Canada and Australia.

After a decade of falling mine production to 1993, output of uranium has since generally risen. Despite its long history, there is little uniformity in the regulatory requirements for the development and production of uranium deposits from country to country. Some countries have a very comprehensive regulatory regime while others have practically none.

²⁰ Much of the information in this section is sourced from the World Nuclear Association <http://www.world-nuclear.org/info> and the Independent Review of Uranium Mining Regulation (UAG, DMP0281009-A

Examining regulatory aspects of other countries must be in the context of production and end use. Key uranium producing countries such as Kazakhstan, Canada and the United States, host nuclear power generation and therefore its regulation expands to cover nuclear issues. This is a very important distinction between these regulatory frameworks and that in Australia, where it is prohibited to engage in any activities of the nuclear fuel cycle beyond the production of uranium oxide.

Kazakhstan

Uranium mining has occurred in Kazakhstan for more than 50 years. It currently has 17 mine projects, five of which are wholly owned by Kazatomprom (a Government owned entity) and 12 joint ventures with foreign equity holders²¹.

Kazatomprom is the national operation of the Republic of Kazakhstan for import and export of uranium, rare metals and nuclear fuel for power plants, special equipment and dual-purpose matters. Core activities include:

- uranium prospecting/exploration and production
- output of nuclear fuel cycle products
- construction of reactors and nuclear power plants
- power industry
- science, social welfare and personnel training.

The primary legislative framework that governs mineral utilisation including uranium exploration and production activities is the *Law of Subsoil and Subsoil Use*. The principles of the framework are to:

- ensure the rational and safe use of mineral resources
- ensure the protection of mineral resources and the environment
- transparency in mining operations; and
- charges for subsoil use.

The scope of the legislation includes administration and granting of exploration rights, which can be provided solely for exploration, production or combined exploration and production. The rights are granted through direct negotiation or either competition (tender) processes.

While this statute governs mining activities, the majority of environmental regulation is detailed within the Environmental Code and enforced through Kazakhstan's Committee of Environmental Regulation and Control. It is the responsible authority for establishing regulatory requirements including those for mining activities.

Canada

In analysing various global regulatory frameworks, the Committee viewed Canada as an example of a leading international regulatory system for uranium mining. Canada was the world's largest uranium producer for many years, but in 2009

²¹ World Nuclear Association, viewed 19 November 2012
Recommencement of uranium mining - a best practice framework.

was overtaken by Kazakhstan. Production comes mainly from the McArthur River mine in northern Saskatchewan province, which is currently the largest in the world. Production is expected to increase significantly from 2013 as the new Cigar Lake mine comes into operation.

Canada's uranium supply is used in commercial nuclear power plants in several countries to produce electricity including Canadian-built CANDU (CANada Deuterium Uranium) reactors, which currently supply about 15 per cent of Canada's electricity.

The Canadian regulatory framework is characterised by distinct regulatory phases. At exploration, each province or territory has responsibility for monitoring activities in its jurisdiction. For production, a single federal body oversees the regulatory process from the initial application to the establishment of a uranium mine or nuclear power plant to decommissioning.

The *Nuclear Safety Control Act 2000* (Canada) (NCSC Act) is the federal Canadian legislation overseeing the regulation of the nuclear energy and nuclear substances. It establishes the Canadian Nuclear Safety Commission (CNSC) which implements the legislation and coordinates the licensing process.

Three steps are required to bring a uranium mine into production. The key requisite for site preparation/ construction to production and operating licences (to be issued by the CNSC) is the completion, with a positive result, of an Environment Assessment (EA). Following this, the company must apply for and receive a site preparation/construction licence from CNSC and apply for and receive an operating licence from the CNSC.

The majority of environmental assessments considered by the CNSC relate to nuclear power facilities, with around 20 per cent of the completed environmental assessments over the last decade relating to uranium mining operations. An appeal can be made to the CNSC by any person who is directly affected by the stipulated decisions of the CNSC.

Key features of the Canadian regulatory framework include²²:

- Both the federal and provincial governments are involved in the nuclear industry licensing process.
- A single regulator (CNSC) has been established at the federal level under specific enabling legislation to administer the whole licensing process for nuclear full fuel cycle activities, including mining, producing, transferring, importing and exporting a nuclear substance, starting from the environment assessment (EA) stage. Various provincial government departments are responsible for granting uranium mining exploration permits and mining leases.
- There appears to be no substantial overlap between CNSC and the various provincial regulators other than the EA stage which may be required to be conducted at both the federal and provincial level.

²² Independent Review of Uranium Mining Regulation (UAG), DMP0281009-A
Recommencement of uranium mining - a best practice framework.

- The federal and provincial governments coordinate in a wider range of nuclear related regulatory processes to streamline the licensing process. For instance, the government of Canada and the government of Saskatchewan entered into an environmental assessment cooperation agreement in 2005 which allows projects that require an EA by these two governments to undergo a single assessment administered cooperatively by both governments.
- The Canadian nuclear regime is generally regarded as flexible, transparent, effective and efficient. A new entrant into the Canadian nuclear industry is easily able to identify the relevant regulatory approval process.

All applications assessed by the CNSC include a public hearing. The CNSC also provides live video webcasting of these public forums and maintains an archive of the video records of these public forums on its website. From an Australian perspective the obligatory public hearing is seen as a major point of difference.

Licensees are required to have a financial guarantee in place for each facility at all phases to cover its eventual decommission costs. In addition, under the CNSC Cost Recovery Fees Regulations, the CNSC charges back to the licensee all costs associated with the regulatory activities.

The CNSC regulates the maximum radiation doses that workers and members of the public may receive. The values are based on the recommendations of the International Commission on Radiological Protection. Radiation exposures of employees and radioisotope concentrations from emissions must be reported to the Health Canada's National Dose Registry.

Saskatchewan: supplementary regulatory requirements

All of Canada's uranium mines are situated in Saskatchewan. Saskatchewan has developed a unique regulatory approach to uranium mine development which operates in addition to the federal *CNSC/Canadian Environmental Assessment Act (CEAA 1992)* requirements.

The instrument is called a 'Surface Lease Agreement' (SLA). An SLA is a two party agreement between the provincial government and the land user. The SLA involves tripartite partnership between industry, government and various communities including Indigenous groups, other northern residents and communities.

Typical provisions of an SLA include use of land limitations, employment policies and practices (including hiring quotas for local Indigenous people) and commercial opportunities (granting contracts to local service suppliers).

United States of America (USA)²³

Uranium mining in the USA today is undertaken by few companies on a relatively small scale. Uranium production in the United States totalled 1811 tonnes of

²³ Source: USA Nuclear Regulatory Commission (NRC).

uranium oxide in 2011 from five underground mines through the White Mesa mill and from five in-situ operations²⁴:

- White Mesa Mill (Utah)
- Alta Mesa project (Texas)
- Crow Butte Operation (Nebraska)
- Hobson ISR Plant/La Palangana (Texas)
- Smith Ranch-Highland Operation (Wyoming)
- Willow Creek Project (Wyoming) (U.S. Energy Information Administration, website 12 December 2012).

The regulatory responsibility for mining activities in the USA depends on the extraction method that the given facility uses. Conventional mining (where uranium ore is removed from deep underground shafts or shallow open pits) is regulated by the Office of Surface Mining, the U.S. Department of the Interior, and the individual states where the mines are located. By contrast, the U.S. Nuclear Regulatory Commission (NRC) regulates in-situ recovery.

NRC becomes involved in uranium recovery operations when the ore is processed and chemically altered. Thus NRC regulates in situ recovery facilities as well as uranium mills and the disposal of liquid and solid wastes from uranium recovery operations (including mill tailings). The possession, use, transport, etc. of uranium produced from mines are regulated by both the NRC and its Agreement States. Regulation begins when the uranium is separated from the surrounding rock (beneficiated) or brought into the milling circuit for refining.

Currently, the NRC regulates active uranium recovery operations in Wyoming, New Mexico, and Nebraska. The NRC does not directly regulate the active uranium recovery operations in Texas, Colorado, and Utah, as they are Agreement States, meaning that they have entered into strict agreements with the NRC to exercise regulatory authority over this type of material.

NRC's role is then confined to oversight. NRC itself currently provides oversight of three ISL sites and one conventional uranium mill. In mid 2012, it was reviewing eight applications for new uranium processing sites, renewal of existing sites, or expansion of sites, and anticipated 16 more applications for uranium processing, including five conventional mills.

The NRC focuses its regulatory actions on protecting the health and safety of the public and the environment during the active life of a uranium recovery operation and after the facility has been decommissioned. The NRC performs the following activities:

- develops regulations and guidance for the regulated community
- reviews license applications and amendments
- develops environmental assessments and EISs to support the agency's reviews
- inspects uranium recovery facilities
- reviews decommissioning plans and activities.

²⁴ World Nuclear Association

Uranium milling and disposal of the resulting waste by-product material are regulated under the *Code of Federal Regulations, Standards for Protection Against Radiation; Domestic Licensing of Source Material* which sets the criteria relating to the operation of uranium mills and the disposition of tailing or wastes produced as a result of the milling process. The Environmental Protection Agency is the lead agency regulating radon, and is also authorised under the *Uranium Mill Tailing Radiation Control Act 1978* to set generally applicable health and environmental standards to govern the stabilisation, restoration, disposal and control of effluents and emissions at both active and inactive mill tailings sites.

The Environmental Protection Agency has delegated and continues to have oversight of the *Clean Water Act 1972* and the *Clean Air Act 1963*, both of which are delegated to Department of Environmental Quality and the *Safe Drinking Water Act 1974*, which is delegated to Virginia Department of Health.

Health and Safety

The Federal Mine Safety and Health Administration, an agency of the United States Department of Labor, administers the provisions of the *Federal Mine Safety and Health Act 1977*. The Federal Mine Safety and Health Administration enforce occupation health and safety laws for all miners at coal and minerals mines as well as all mineral processing operations. Its regulations provide exposure limits for radon, gamma radiation, silica, and diesel fumes.

The Nuclear Regulatory Commission developed regulations that implement the *National Environmental Policy Act 1982*. Under this Act the NRC develops an EIS for major federal actions significantly affecting the quality of the human environment. Licensing for any nuclear facility is considered a major federal action and requires an EIS. The EIS process includes:

- **Reclamation**

Under the *Uranium Mill Tailings Radiation Control Act*, the Department of Energy is charged with completing surface reclamation at inactive uranium mill tailings sites. Uranium tailings piles that meet certain criteria must be turned over to the Department of Energy or the state for custody of and long-term care, including monitoring, maintenance, and emergency measures necessary to protect the public health and safety.

- **Transport**

Radioactive materials are shipped in the United States either by road, rail, air or water. The safety of these shipments is regulated jointly between the Nuclear Regulatory Commission and the Department of Transport. The Nuclear Regulatory Commission establishes the requirements for the design and manufacture of packages, while the Department of Transport regulates the shipments as they are in transit, sets standards for labelling and smaller quantity packages.

3.6 Key strengths and weaknesses of existing regulatory frameworks

Strengths

In examining the overall strength of the existing regulatory framework for uranium mining in Australia, it is generally acknowledged that the present systems are robust and functional, applying standards consistent with Australia's international obligations, meaning the current generation of uranium explorers and miners are operating at standards equal to or better than those in other countries.

Other strengths identified include:

- appropriate delegation of responsibility for tenure and operational approvals to state authorities given the division of regulatory powers between the Australian Government and the states and the experience and expertise within relevant state government agencies in relation to such matters
- comprehensive regulatory controls throughout the uranium supply chain that apply both generalised and prescriptive parameters to achieve environmental and safety objectives
- endorsement and use of outcome-based regulation to environmental management of uranium mining, albeit still developing
- mechanisms for the implementation and revision of guidelines and standards consistent with 'world's best practice' in the uranium industry.

Australia's plentiful uranium reserves give it a strong competitive advantage in the global uranium market. Australia also enjoys:

- developed nation status and political stability
- a strong reputation for quality and reliable product supply
- comprehensive safety standards
- a reputation for strong environmental management programs
- a long standing and consistent commitment to non-proliferation.

Weaknesses

Industry has provided views to the Committee suggesting that the existing regulatory framework governing uranium mining in Australia remains overly complex, time-consuming, inflexible and subject to a number of duplications.

From an industry perspective, the key weakness of the existing regime is the duplication and inconsistency of regulatory requirements due to the overlap of federal and state spheres of responsibility, especially in the context of federal environmental approvals for uranium developments under the EPBC Act, which creates inefficiencies and redundancies at various points along the uranium mining approvals pathway.

Companies proposing to mine uranium must obtain environmental approval under both state and federal environmental legislation, and the results can be inconsistent. For example, a recent proposal to mine uranium in Western Australia has already received state ministerial approvals under Western Australia's *Environmental Protection Act 1986*, yet the Australian Government has sought additional

information from the proponent despite assurances that a ministerial decision under the EPBC Act was imminent.

The resources industry submitted to the Committee information about the importance of having effective and workable bilateral agreements between state and federal governments to ensure that assessment and approval processes are as streamlined as possible.

These deficiencies in the overall framework are further exacerbated by the fact that a 'functions based approach' dominates the exercise of regulatory responsibilities, resulting in a multitude of state and Australian Government agencies and organisations which administer the differing aspects of the approval regime for uranium mining. This has particular implications for the transport of uranium across state boundaries, in which case a uranium miner must navigate multiple safety regimes (including obtaining separate approvals) and deal with multiple regulatory authorities at both the state and federal level, despite the existence of a standard code of conduct for the transport of radioactive substances in Australia.

There is also evidence to suggest²⁵ that despite a robust and effective environmental and radiation protection regulatory framework, negative and ill-informed community perceptions of the risks surrounding uranium mining have been a significant barrier to the potential expansion of the industry. Another possible weakness is that Queensland authorities will have little practical contemporary experience in assessing uranium mining proposals, as uranium has not been mined in Queensland since 1982.

A further important consideration is the need to address the gap between scientific knowledge of uranium versus community perceptions, and the importance of educating the public and stakeholders on the nature of uranium mining and the performance of the industry.

Committee's jurisdictional visits

Appendix C provides a summary of the Committee's field trips, with a focus on the Committee's observations of regulation and operational practices in other jurisdictions.

²⁵ Review of regulatory efficiency in uranium mining, Uranium Council - Final Report: 2008

4. Best practice approvals framework for Queensland

The Queensland Government's role in facilitating and regulating uranium mining would be similar to the role the state currently plays in the facilitation of all mining developments. This includes administering a robust and efficient regulatory structure across the broad framework of steps in the development process from issuing exploration permits to the environmental impact assessment (EIA) approvals process to eventual mine closure and rehabilitation (see Table 3.0 and Box 3.3 in Chapter 3).

This chapter explores a number of key processes in the state's regulatory framework that would require enhancement to meet best industry practices. These processes include EIA approvals (including meeting any gaps in skills and expertise within the Queensland Government), stakeholder communication and education, and transport. Furthermore, a committee would be established to oversee uranium mining implementation, operations and rehabilitation in Queensland.

The Committee has concluded that Queensland's existing framework for the regulation of mining and radiation safety is appropriate for the recommencement of uranium mining in this state. A new legislative framework is not required. The Committee has, however, made recommendations about how the existing framework could be adapted to ensure the recommencement of uranium mining meets best practice. Figure 1 Queensland uranium mining policy and regulatory framework, in Chapter 1 broadly illustrates the overarching best practice policy framework that the Committee is recommending be applied to uranium mining in Queensland. The diagram over page, 'Queensland uranium mining - policy and regulatory relationships, also illustrates the regulatory and policy relationships within this framework.

4.1 Role of the Queensland Government in facilitating and regulating uranium mining

Achieving best practice approvals framework

As discussed in Chapter 3, Queensland's mining and resource sector has an established integrated framework of legislation, regulations, policies and guidelines in place that can be applied to uranium mining. In addition to Queensland's framework, the Australian Government also has an established regulatory process for uranium mining that includes EIA and the transport and export of uranium oxide.

As discussed throughout this report, a regulatory framework for a world's best practice uranium mining industry would involve:

- a robust and efficient EIA process
- expertise in the assessment and monitoring of uranium mines to fill any skills gap within the Queensland Government's regulatory agencies
- a robust framework that would safely manage the transportation of uranium oxide from a mine site to the export port.

Robust and efficient EIA process

A critical pathway for the development of a uranium mining proposal is the EIA process that assesses the possible positive or negative impact that a proposed project may have on the environment. The EIA process includes aspects associated with the environment, society and the economy.

As detailed in Chapter 3, there are three separate EIA processes in Queensland that would apply to all uranium mining development proposals:

1. *Environmental Protection Act 1994* (EP Act)
2. *State Development and Public Works Organisation Act 1971* (SDPWO Act)
3. *Environmental Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act).

A key finding from the Western Australian Government's review of the uranium mining regulatory framework was the need to improve the state's coordination of regulatory approval processes. This concern was also expressed in submissions received through the Committee's public consultation process.

The use of the SDPWO Act, administered by the Coordinator-General, would achieve a coordinated, best practice EIA approvals process where there is a requirement:

- for the EIA process to be centrally coordinated for all proposed uranium mining projects
- that provides an holistic assessment approach (the SDPWO Act accounts for matters under the EP Act, MR Act and SP Act)
- that has the ability to impose conditions for both on mining lease and off mining lease activities
- that has the flexibility to deal with the Australian Government's assessment processes and provide greater public confidence in the robust assessment of uranium mining developments in Queensland.

The Committee considers this will be achieved through the existing 'coordinated project' process overseen by the Coordinator-General.

Recommendation 4.1

The Committee recommends the Queensland Government should establish a policy for all uranium mine proposals to be assessed by the Coordinator-General as a 'coordinated project' under the *State Development, Public Works Organisation Act 1971* (SDPWO Act), with the policy subject to review by the Resources Cabinet Committee once the process is established, but not before two years after the first proposal is received. If adopted, the Committee encourages the development of a detailed whole-of-government approvals chart to demonstrate the coordinated projects process to the industry and to demonstrate the rigour of the approvals process to the public.

Further discussion of the Coordinator-General's EIA process is provided in Section 4.3.

Bilateral assessment improves efficiency

A feature for all uranium mining development proposals in Queensland (and in other states and territories) is the requirement that it can be assessed as a controlled action

under the EPBC Act and therefore referred to the Federal Department of Sustainability, Environment, Water, Population and Communities (SEWPaC).

The EPBC Act is the Australian Government's central piece of environmental legislation. It provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places as defined in the Act as matters of national environmental significance (see Chapter 3 for more detail).

The EPBC Act includes a bilateral agreement mechanism to ensure that federal and, state governments do not duplicate their environmental assessment functions and impose subsequent inefficiencies in the assessment and approval process for projects that include matters of both local and national environmental significance. Accordingly, the EPBC Act enables the Australian Government to join with the states and territories in providing a national scheme of environment and heritage protection and biodiversity conservation.

Under the bilateral agreement, the Australian Government enters into an agreement with a state or territory government to delegate the environmental assessment responsibility to the relevant state or territory. However, this agreement still requires assessment approval from the Minister for SEWPaC under the EPBC Act.

The Queensland Government has a bilateral agreement with the Australian Government to allow for a combined assessment process for state and federal approvals.

Recommendation 4.2

The Committee recommends that the assessment of a uranium mine for the purposes of the *Environmental Protection and Biodiversity Conservation Act 1999 (Cwlth)* (EPBC Act) should be undertaken according to the bilateral agreement between the Queensland and Australian Governments. The Queensland Government should seek the agreement of the Australian Government to assess all uranium mining proposals in Queensland under this bilateral agreement.

Continuous improvements in the efficiency of the approvals process

A key feature of the EIA approvals process under the SDPWO Act is that it accounts for matters under the EP Act and MR Act.

The EP Act is the primary Queensland Government legislative tool that is fundamentally concerned with environmental protection and with the broad objective of achieving sustainable ecological development. This objective is achieved by setting out a program for the identification and protection of environmental values and by creating a range of regulatory tools for controlling the activities of parties. The EP Act creates a general duty of care for parties to take all reasonable and practicable steps to avoid harm to the environment.

Since its establishment, the EP Act has become increasingly complex. The process for licensing environmentally relevant activities (ERAs) has not been substantially reviewed since the enforcement of the EP Act. Regulation has been added over time as a result of emerging environmental issues and changing community expectations. Also, many of the outcomes that the legislation sought to achieve have become standard business practice. As a result, the regulatory environment can be simplified, and a more

proportionate regulatory framework can be put in place to ensure that it is focused on those activities that have higher environmental risk.

The Department of Environment and Heritage Protection's (EHP) Greentape Reduction project was established in response to business and government concerns that the regulatory environment had become unnecessarily complex and difficult to navigate. Through consultation a number of initiatives were identified to simplify and improve the licensing processes under the EP Act, whilst maintaining environmental outcomes. A key aim of the project is to reduce the regulatory burden to business and government associated with environmental regulatory requirements by:

- introducing a licensing model proportionate to environmental risk
- introducing flexible operational approvals
- streamlining the approvals process for mining and petroleum
- streamlining and clarifying information requirements
- achieving the above whilst maintaining environmental outcomes.

The *Environmental Protection (Greentape Reduction) and Other Legislation Amendment Bill 2012* (the Greentape Reduction Act) was passed by parliament on 31 July 2012. It will amend the EP Act and come into force on 31 March 2013. The Greentape Reduction Act introduces an integrated approval process for environmentally relevant activities which will allow for requirements to be proportional to the environmental risk of the activity.

Another key Queensland Government initiative is the Department of Natural Resources and Mines' (DNRM) *Mines Legislation (Streamlining) Amendment Act 2012 (Streamlining Act)*. Passed in Parliament on 29 August 2012, this initiative introduces efficiencies and wide-ranging reforms to the resources acts, including the MR Act.

The Streamlining Act is designed to streamline and harmonise procedures for granting, and dealing with, various resource interests. The Streamlining Act's primary focus is to streamline and harmonise procedures for applying for, and dealing with, various types of resource interests, including exploration permits, authorities to prospect, mineral development licences, mining leases and petroleum leases.

These two initiatives are expected to improve the efficiency of the current regulatory approval processes that would apply to uranium mining.

Recommendation 4.3

The Committee recommends the Queensland Government should facilitate and attract investment from industry by providing an approvals process that is efficient and provides certainty regarding the expectations placed on industry. Therefore, along with assessing uranium mining proposals as 'coordinated projects', the Committee strongly supports initiatives such as the Department of Environment and Heritage Protection's (EHP) Greentape Reduction project and the Department of Natural Resources and Mines' (DNRM) Streamlining Approvals project to enhance the efficiency of the approvals process, while maintaining its rigour.

Skills and expertise in the assessment and monitoring of uranium mines

Uranium mining has not been undertaken in Queensland since 1982. This means there is a requirement for a specialised set of skills and expertise across the approvals framework that includes the EIA process, operational monitoring, radiation management and mine safety and health. It is expected that government departments would be required to collaborate closely to utilise existing skills and expertise in the approvals framework.

To meet best practice expectations, a representative advisory group should be formed to oversee the reintroduction of uranium mining. This group would support the existing skills and expertise sets and provide transparent reporting that would enhance stakeholder confidence in the industry. This group would also provide a mechanism to review the regulation and environmental performance of the industry (including compliance and performance reporting), improve the regulatory efficiency and harmonise approval processes, particularly those involving cross-jurisdictional issues such as transport.

Recommendation 4.4

The Committee recommends that a whole-of-government Uranium Mining Oversight Committee (UMOC) should be established to oversee uranium mining implementation, operations and rehabilitation in Queensland. This should include high level membership from all relevant departments and be chaired by the Department of Natural Resources and Mines. The UMOC should:

- **guide the implementation of the recommendations in this report that are accepted by the Queensland Government**
- **provide advice to the Coordinator-General during the assessment process**
- **oversee the compliance and performance of uranium mines during the operation and rehabilitation phases.**

The Committee has recommended an indicative Terms of Reference for the UMOC in Appendix D.

Augment existing skills and expertise

To meet best practice and address the potential skills gap among Queensland's regulatory agencies, the Queensland Government could draw on external expertise. One option could be to draw external experience from established sources in the uranium mining industry, for example, from SEWPaC's Supervising Scientist Division (SSD).

SSD is headed by the Supervising Scientist, a statutory position established under the *Commonwealth Environment Protection (Alligator Rivers Region) Act 1978*. The Supervising Scientist was established following the Australian Government's decision to approve uranium mining at Ranger in the Northern Territory to meet the need for an independent supervisory body to ensure that the environment of the Alligator Rivers region is protected from the potential impacts of uranium mining activities.

SSD maintains two units: the Office of the Supervising Scientist (OSS) and Environmental Research Institute of the Supervising Scientist (ERISS). Further information on SSD, OSS and ERISS can be found in Chapter 3.

Recommendation 4.5

The Committee recommends that Queensland Government should seek independent specialist advice to the UMOC, with expertise in managing the environmental performance of uranium mining.

Recommendation 4.6

The Committee recommends that the Queensland Government should approach the Australian Government on using the Supervising Scientist Division (SSD) for this specialist advice.

Communication and consultation

A critical issue that emerged during the Committee's consultation process was the requirement to provide appropriate communication and education materials on the uranium industry and the associated regulatory framework to address community concerns with the reintroduction of uranium mining in Queensland.

These concerns primarily relate to regulatory issues and health and safety issues in the mining processes and to the transport of uranium oxide within Queensland. These issues are particularly relevant in regions with known uranium deposits.

To meet best practice conventions, a committee should be established to provide an effective forum between community, industry and government representatives to discuss and resolve community matters concerning the uranium mining industry and to build local communities' awareness and understanding of the industry.

In addition to legislated notification periods, community consultation associated with uranium mining proposals should be encouraged as early as possible to facilitate an understanding of community values and concerns, to maximise their consideration during assessment and approvals and to maximise the opportunity for the community to fully understand the project.

This committee would likely host community forums and facilitate discussions to provide an understanding of community values and concerns and to inform and update the community on the development of the uranium mining industry. This would be in addition to the required consultation processes within the EIA process.

Important aspects of the communication process would be to:

- undertake research and development
- provide facts on uranium mining to relevant uranium mining stakeholder committees
- report on the environmental performance of uranium mines, including the outcomes of periodic audits of uranium mining sites
- work with government and industry in developing the appropriate communication and educational materials on the uranium industry and the associated regulatory framework including developing fact sheets, diagrams and frequently asked questions.

Recommendation 4.7

The Committee recommends the Queensland Government and industry should establish a Uranium Mining Stakeholder Committee (UMSC) that is supported by the UMOC. The UMSC should include representatives from local governments, Indigenous groups, industry, environment and natural resource management groups. The Committee has recommended indicative Terms of Reference for the UMSC in Appendix D.

Recommendation 4.8

The Committee recommends that the UMOC should be responsible for ensuring that appropriate communication and education strategies are developed to inform the community about uranium mining. These strategies need to be developed in conjunction with industry and the Australian Government's expert agencies.

4.2 Tenure approvals

Tenure permits are currently administered by DNRM under the MR Act.

The Committee notes that the previous ban on uranium mining was implemented through the use of the public interest provisions under the MR Act. Accordingly, there are no legislative provisions that ban uranium mining and it is considered that no amendments need to be made to the MR Act.

This is on the basis that the existing mining lease application process, which is the final tenure step that approves the commencement of mining, is already sufficiently robust to capture uranium mining. The nature of the provisions which require a proponent to demonstrate its financial and technical capability is sufficiently flexible and can capture uranium.

In addition, there are no compelling reasons to amend these provisions to address uranium specific matters through capability assessment. Matters such as a proponent's ability to meet financial commitments are largely independent of whether uranium is being mined and relate to a company's capital structure. Any technical requirements that require action (such as radiation plans) are addressed through other mechanisms and are not assessed as part of the tenure process.

Recommendation 4.9

The Committee recommends that no changes are required to the current tenure framework as it is sufficiently robust and can capture uranium activities.

Types of tenure

There are five tenure approvals that a uranium mine developer would potentially be required to apply for:

1. prospecting permit
2. exploration permit
3. mining claim
4. minerals development lease
5. mining lease.

The application process for an exploration permit and mining lease are provided below as these are the more important steps in the approvals process relevant to uranium mining. Further information on tenures can be found at the DNRM website (<http://www.dnrm.qld.gov.au/>) under Mining, exploration and petroleum - Tenure, fees, royalties and rents.

As part of this process, a uranium mine developer would be required to pay tenure rental to the Queensland Government. Tenure rental is discussed in Chapter 9 – Resource royalties and charges.

Exploration permit

Proponents seeking to explore for uranium would require an exploration permit for minerals (EPM). The granting of an exploration permit also requires an Environmental Authority (EA), under the EP Act that is administered by EHP.

The MR Act provides for an assessment process to determine the suitability of a proponent for an EPM. As part of this assessment process, the Queensland Government requires specific information from the explorer on the work that is planned over the proposed permit area and the capability (both financial and technical) to meet their committed activities. To be granted an EPM, explorers are required to demonstrate a clear purpose and outcome to the Queensland Government as part of the assessment process. Proponents are not required to declare the specific mineral(s) for exploration in their application to the Queensland Government - the targets for exploration are provided through a proponent's work program.

The assessment process includes submitting a detailed work program that details the specific operations to be undertaken over the proposed life of the EPM. A typical work program might include:

- a data review of available data, including any on ground scoping and site identification and preparatory mapping
- target selection including a sampling program to confirm the anomalous results and further mapping
- geochemical and geophysical surveys and geophysics followed up through more detailed geochemical sampling work and / or geophysics
- drilling of delineated targets.

The proposed work programs, if accepted, would be part of the proposed conditions of the EPM when issued. Ongoing compliance with the EPM conditions is a requirement.

Requirement to report mineral discovery

Reporting to the Minister for Mines is also required when an exploration permit holder discovers within its permit area any mineral of commercial value in what appears to be payable quantities. The Minister may then direct the proponent to apply for a higher form of permit, which is intended to foster resource development. Failure to do so may result in the Minister cancelling the exploration permit.

Mining lease

Before any mining can occur, a proponent of a uranium mine development must apply for a mining lease (ML) which permits the proponent to mine, including the type of mining

(e.g. open-cut or underground) and the minerals to be mined, and to carry out activities associated with mining or promoting the activity of mining.

For a uranium mine development proponent, an ML requires detailed evidence to support the application. This includes the proponent providing the following:

- detailed statements outlining the mining program proposed, its method of operation, and providing an indication of when operations are expected to start
- proposals for infrastructure requirements necessary to enable the mining program to proceed, or additional activities to be carried on to work out the infrastructure requirements
- specifics regarding the estimated human, technical and financial resources proposed to be committed to operational activities for the mining lease during the term of the lease
- a statement detailing the applicant's financial and technical resources.

The assessment process for an ML includes the approvals process which focuses on resource tenure management and environmental value management. In reviewing the assessment process for an ML for uranium mining it appears that there is a suitable set of legislation, regulations and guidelines that provides for a robust assessment during the approvals process.

Annual reporting requirements for tenure holders

The MRA contains reporting provisions and compliance requirements which contribute to the objectives of the Act. Specifically, there are annual reporting requirements for permit holders based on its exploration or mining activities and the broader work program that it has committed to undertaking.

The purpose of the reporting is to ensure that commitments by proponents are met and will assist in DNRM's future tenure decisions (such as permit renewal). Additionally, failure to meet commitments may result in actions by the Department to pursue cancellation of tenure or a fine to the proponent. The data associated with these activities is required to enhance the State's knowledge of its mineral resources and will be made available to the public, including potential explorers, only after the permit has expired. This may inform future decisions to undertake exploration activities by resource companies.

Land access and Indigenous land rights

Timely access to land for exploration and mining purposes is important to the successful development of a sustainable uranium mining industry in Queensland. Likewise, a balance must be achieved between the interests and rights of landowners and the sustainable growth of the agriculture and resource sectors.

Land access and Indigenous land rights are discussed in various chapters throughout this report.

As discussed in Chapter 7 – Economic and community development, the current framework relating to land access compensation, the rights of landholders and the protection of prime agricultural land from mining are appropriate for the recommencement of uranium mining. As discussed in Chapter 8 – Indigenous rights, the application of the current statutory processes related to access for Indigenous people and Indigenous land rights are appropriate for the recommencement of uranium mining in Queensland.

Further information relating to land access and Indigenous land rights is contained in Appendix F, and at the DNRM website (<http://www.dnrm.qld.gov.au/>) under Mining, exploration and petroleum - Land access and Native Title.

4.3 Environmental impact assessment approvals process

Declared 'coordinated project' process

The Coordinator-General administers the EIA process under the SDPWO Act on behalf of the Coordinator-General. The Coordinator-General has wide ranging and overarching powers to:

- work with other legislation, such as the SP Act, EP Act and the MR Act
- declare 'coordinated projects'
- recommend (or refuse) project development applications
- set and impose development conditions
- set the state's planning framework through the SDPWO Act and SP Act.

Using the SDPWO Act's EIA process for uranium mining development proposals has a number of advantages over the EIA process under the EP Act and would incorporate any assessment required under the SP Act for off mining lease activities. These advantages include:

- Environmental coordination - this process provides a centralised coordination role for the EIA process across all government agencies to ensure the recommencement of the uranium mining industry in Queensland is undertaken according to a comprehensive assessment of environmental, social, employment, health and safety, infrastructure and agricultural impacts. Under the SDPWO Act the Coordinator-General has the power to direct government advisory agencies to be involved in the EIA process. Under the EP Act, government advisory agencies are not required to be involved in the EIA process.
- Holistic approach - the SDPWPO Act accounts for matters under the EP Act, MR Act and SP Act. The SDPWO Act also includes assessment for social and economic impacts. The EP Act only deals with matters that are relevant to activities on mining leases.
- Impose conditions for on mining lease and off mining lease activities (for example, for both road and rail transportation and port) - a central component of the EIS process is the provision of 'conditions' by the Coordinator-General to an EA under the EP Act, a proposed ML under the MR Act and a development permit under the SP Act for off mining lease activities. An advantage to impose conditions is the ability to fill gaps in legislation where an assessment is required, for example social impact assessment, safety and agricultural impacts. The EP Act cannot impose conditions for off mining lease activities.
- Bilateral agreement and parallel process with the Australian Government - the EIA process is subject to legislated timeframe which can conflict with the federal EIA process under the EPBC Act. The EIA process under the SDPWO Act is not subject to legislated timeframes (although timeframes are benchmarked to meet proponent expectations) which provides for a more flexible engagement with the Australian Government.

- Greater stakeholder confidence in the EIA process - due to the combination of the above, a uranium development assessed under the SDPWO Act EIA process would provide greater public confidence that all environmental issues, including transport, social, employment and economic are fully measured and evaluated in a centralised and coordinated arrangement. Supporting this assessment approach, a comprehensive engagement program would be developed to investigate all stakeholder issues.

The following are the principal development decisions for 'coordinated projects' for which the EIS process under the SDPWO Act may be used:

Approvals under the *Mineral Resources Act 1989*

- ML applications

Authorities under the EP Act

- development approval for an environmentally relevant activity
- EA for a mining lease

Approvals under the SDPWO Act

- material change of use in a State Development Area
- approval for an application in relation to a Prescribed Development
- approved works under Part 6 Division 4 of SDPWO Act

No other approval regime

- where there is no other approval regime from the above items
- the CG may impose conditions
- these conditions have effect as if they were applied under SP Act and/or EP Act

Development approvals under the SP Act

- material change of use (MCU) for site
- major operational work (such as dams, marinas, reclamation)
- development approval for an environmentally relevant activity, under EP Act.

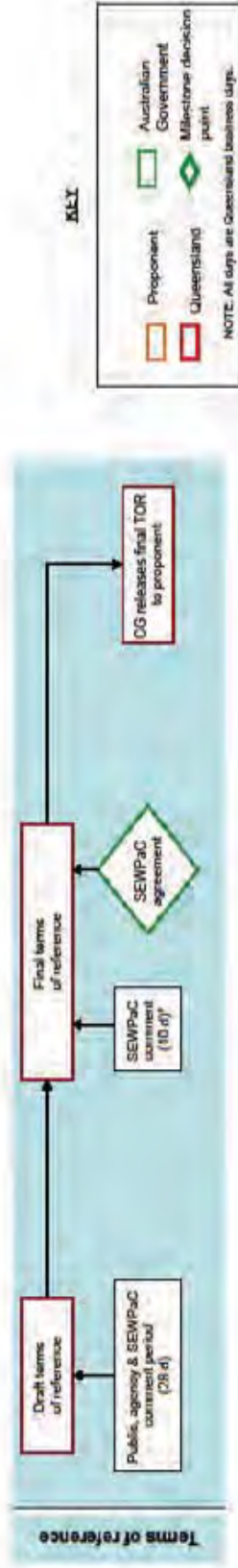
Further information on the 'coordinated projects' process can be found in Chapter 3.

SDPWO Act EIA in practice

The following diagram illustrates how the EIS process under the SDPWO Act works in practice.

Coordinated project EIS process

undertaking under the SDFWO Act and the bilateral agreement between the State of Queensland and the Commonwealth



Assessment documentation
EIS & supplementary reports

Assessment report

The following table summarises the key steps involved in the SDPWO Act EIA process administered by the Office of the Coordinator-General on behalf of the Coordinator-General with reference to the SDPWO Act and key decision points.

Key elements of SDPWO Act EIA process

1. IAS	2. TOR	3. EIS	4. SEIS*	5. Approval	6. Change Report
Submit Initial Advice Statement and apply for 'coordinated project' declaration.	Prepare draft TOR.	Prepare draft EIS.	Additional information and SEIS.	Prepare CGs EIS Evaluation Report.	Proponent applies to change project or conditions and provides details.
Initial advice public notice.	Public review of draft TOR.	Revise draft EIS. Prepare final EIS.	Advisory Agency endorsement of SEIS	Approval of EIS and EIA.	CG prepares EIS change report - public consultation.
Declaration of 'coordinated project' for which EIS is required.	Finalisation of TOR.	Public review of EIS.	Advisory Agency final conditions.	Assessment manager issues the environmental authority or development permit.	CG approves changes.

* Supplementary Environmental Impact Statement (SEIS)

Further information on the approvals process under the SDPWO Act can be found on the Queensland Government's Department of State Development, Infrastructure and Planning (DSDIP) website (<http://www.dsdip.qld.gov.au/>) under Coordinator-General projects, and in Chapter 3 of this report.

EPBC Act referral

A uranium mining proponent must also apply to SEWPaC to have their project assessed as a controlled action under the EPBC Act.

The bilateral agreement between the Australian and Queensland Governments accredits the Queensland EIA processes under the SP Act, EP Act and SDPWO Act to apply to assessments which trigger the EPBC Act. However, Queensland needs confirmation from the Australian Government that this extends to uranium mining.

Further information on the EPBC Act process can be found on the SEWPaC website (<http://www.environment.gov.au/index.html>) under EPBC Act and in Chapter 3.

4.4 Transport

The transport of radioactive material in Australia, including uranium oxide, is already subject to state and federal regulation. However, the state authorities are primarily responsible for the regulation, licensing and compliance monitoring of the transportation of radioactive materials within their borders.

All uranium mining companies in Australia would be required to adopt best practice standards for storing and transporting radioactive materials to minimise the risk of radiation exposure to workers and the general public, as well as the environment. After uranium is mined and milled, it is to be securely stored on the mine site before it is transported.

Common dangerous goods such as various types of chemicals and radioactive materials (e.g. uranium oxide) are already transported safely and securely through Australia's transport network: road, rail, sea, air and inland waterways. Uranium oxide is currently transported through the South Australian and the Northern Territory transport networks. Uranium oxide from future mines in Western Australian is likely to be transported primarily via the road network across the South Australian or Northern Territory borders.

In Queensland, the transportation of radioactive materials and devices used for medical treatments and products of metalliferous mining operations already occurs within the network.

Transport regulatory framework

As discussed in Chapter 3, a suite of international, Australian and state laws, regulations, standards and guidelines already exist to ensure world's best practice in the transport of radioactive materials.

Proponents of uranium mine developments would be subject to these laws and standards which provide radiation protection and risk mitigation.

Queensland regulation

In Queensland, the transport of radioactive materials such as uranium oxide is regulated under the *Radiation Safety Act 1999* which is administered by Queensland Health (QH 2013). The Act requires a person transporting uranium oxide to hold a transport licence. For transport by road only an individual can hold a licence, for transport by rail or sea a licence or permit can be held by a company or an individual.

It is a standard condition of a transport licence for radioactive materials (QH 2013b) that the holder also complies with the *Code of Practice for the Safe Transport of Radioactive Material* (Transport Code).

The Transport Code requires the establishment of a Radiation Protection Programme (QH 2013). This program also requires approval from Queensland Health as part of the licence application process. Each uranium mining proponent will need to develop a Radiation Protection Programme for the transport of uranium oxide from their mine site and submit it to Queensland Health for approval and monitoring. Queensland Health has developed a generic program that is suitable for, and has been adopted by, most parties with a transport licence. It is likely that the transport of uranium oxide might necessitate development of a similar, but purpose-specific Radiation Protection Program.

The Radiation Protection Programme must include:

- measures to keep radiation doses as low as reasonably achievable
- provision for dose assessment or monitoring, if worker's doses are likely to exceed one millisievert per year
- emergency procedures in the event of an accident
- training about precautions to be taken to reduce radiation exposure.

Feedback provided through submissions from industry bodies such as Queensland Resources Council (QRC) has indicated a strong preference for companies, rather than individuals, to be licensed for the transport of uranium oxide by road in Queensland and that the assessment criteria for transport licence applications be reviewed.

Furthermore, feedback from the Western Australian Government indicated that any person who transports radioactive substances in Western Australia must be licensed or work under the direct supervision of a licensee. This highlights that Australian states have differing application of licences for the transport of radioactive material by road.

It is likely that uranium oxide from Queensland would be exported through Port Adelaide and the Port of Darwin, which are the only ports currently permitted to export uranium oxide.

As discussed in Chapter 3 – Uranium industry regulation, for uranium oxide to be transported from Queensland to either South Australia or the Northern Territory, this would trigger a requirement that transporters meet differing cross-jurisdictional uranium transport licence requirements. This would result in inefficiencies and increased costs in the transport task.

Possible solutions to this varied licence landscape would be either to harmonise cross-jurisdictional uranium transport licence requirements or mutual recognition of each state and territory's licence obligations.

Recommendation 4.10

The Queensland Government should work with the Northern Territory, South Australian and Western Australian governments to establish an inter-state committee to oversee and harmonise transport and logistics associated with the uranium mining industry, including the mutual recognition of transport licences and the consideration of individual or company licensing of transport operators. The Australian Government should also be invited to join this committee and it should also cooperate with the Uranium Council.

National Code of Practice

Under the National Directory for Radiation Protection, as agreed to by the federal, state and territory governments, Australian regulators must, in their regulatory framework, adopt *RPS 2 - Code of Practice for the Safe Transport of Radioactive Material* (the Transport Code). The scope of this Code covers the transport of radioactive material by road, rail, and waterways under the jurisdiction of states and territories in Australia.

The Transport Code was developed by the state and federal governments working through the Radiation Health Committee to establish uniform requirements for the transport of radioactive material throughout Australia.

The Transport Code adopts the IAEA *TSR-1 Regulations for the Safe Transport of Radioactive Material 2009* with some minor amendments to suit Australian circumstances.

A supporting document to the Transport Code, the *Safety Guide for the Safe Transport of Radioactive Material* (ARPANSA 2013), was also developed to assist persons in meeting their responsibilities under the Transport Code.

Federal regulation

While in general, the states and territories regulate uranium transportation across their networks, the Australian Government regulates the export of uranium ensuring compliance with Australia's commitments under international laws.

Pursuant to the *Customs (Prohibited Exports) Regulation 1958* (Cwlth), made under the *Customs Act 1901*, it is necessary to obtain permission from the federal Resources Minister to export uranium. Applications to export uranium are assessed by the Department of Resources, Energy and Tourism (DRET) and the Australian Safeguards and Non-Proliferation Office (ASNO) to ensure export complies with the Australian Government uranium export policy.

Export permits are typically subject to stringent conditions, requiring for example provision of export contracts to DRET before shipment occurs, safeguard clearances for each individual shipment and reporting requirements (QRC submission 2013).

QRC added that the Committee should note that safety and security requirements applicable to the port facility itself differ to those of shipping. The safety requirements for managing radioactive materials at both a federal and state level apply, and any licences or approvals for the storage and security of radioactive substances also apply to ports. Of course, these licences and approvals would supplement the safety guidelines and policies under the maritime safety and the IMDG Code.

The *Australian Radiation Protection and Nuclear Safety Act 1998* (Cth) provides for the protection of human health and the environment from the harmful effects of radiation. This Act establishes the *Australian Radiation Protection and Nuclear Safety Agency* (ARPANSA), which is responsible for regulating federal activities in regard to radiation – for example, the Lucas Heights research reactor. ARPANSA also leads the development of standards, codes of practice, guidelines and other relevant material to support radiation protection and nuclear safety throughout Australia.

Within their submission to the Committee, ARPANSA highlighted that a uniform national framework for radiation protection regulation in Australia has been endorsed by the Australian Health Ministers Conference – the *National Directory for Radiation Protection* (NDRP). As such, state and territory governments have undertaken to incorporate the NDRP requirements into their regulatory framework irrespective of which agency takes the lead on particular issues.

International compliance

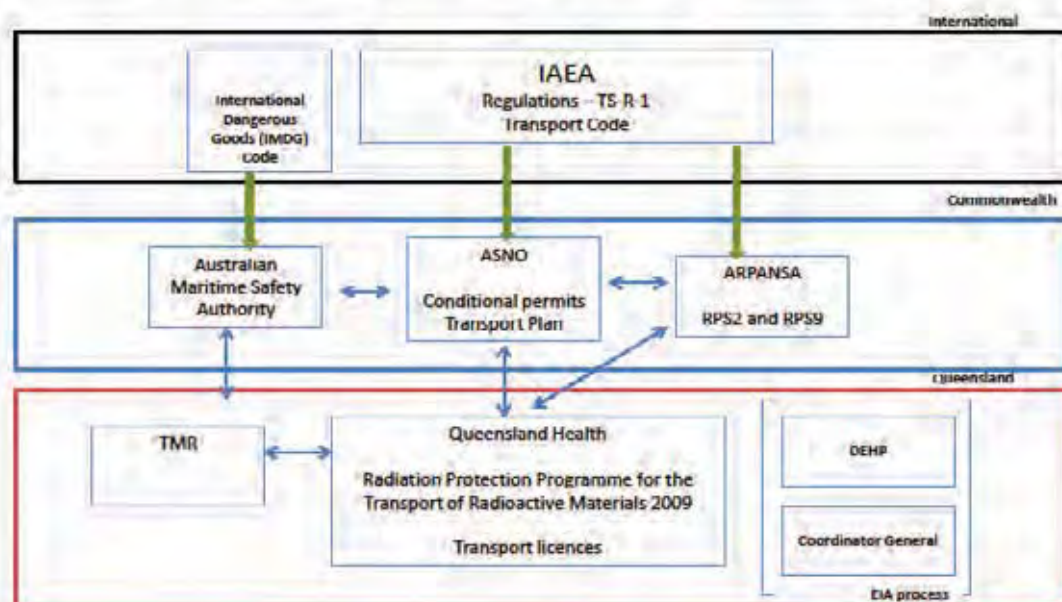
As a member of the International Atomic Energy Agency (IAEA), Australia is subject to the standards for the *Regulations for the Safe Transport of Radioactive Material*, (TSR-1) which are used throughout the world for the transport of radioactive material in general, not solely for uranium oxide.

Road and rail, the most likely form of transport to be used by future mining operators in Queensland, is governed by TSR-1 as well as United Nations provisions for the transport of dangerous goods (all modes).

For transport by sea, the International Maritime Organisation (IMO) *International Maritime Dangerous Goods Code* (IMDG Code) is the international instrument to be applied to the carriage of dangerous goods by any kind of sea. It sets requirements such as packaging and container stowage, segregation of incompatible substances.

These international codes of practice are represented in the following diagram, along with further description of Queensland's current regulatory practices for the transport of radioactive material in general.

Regulatory basis for transport



Representation of the regulatory basis for transport of uranium oxide in Queensland.

Selection of mode of transport for processed uranium

In Queensland, uranium oxide will most likely be transported by road. Road transport is likely to be the most cost-effective mode given the low volume/high value nature of uranium mining. It also meets the IAEA and ARPANSA equivalent safety standards enshrined in the relevant regulations of those two jurisdictions.

Road transport is likely to be faster overall, to minimise modal transfer issues and the number of people and facilities involved, and has associated benefits in terms of security, tracking and licensing of sites and persons involved in the transport, storage and transfer task. It also significantly reduces the number of people handling uranium oxide for an extended period.

Rail transport may be an option if there is a rail line close to the mine site, and direct connections to the chosen port of export. In Queensland, east coast ports have rail access to the regions where uranium deposits are located, as depicted in Figure 2.1.

The small amounts of uranium oxide to be transported probably means it would be as a consignment on a general freight train, rather than via a dedicated train hauling only uranium oxide. Capacity constraints on parts of Queensland's rail network are likely to mean "one off" uranium specific trains will be difficult to accommodate within current schedules. Transport by rail of uranium oxide may be viable if uranium mines also produce bulk quantities of other minerals for export.

Transporting uranium by road to a rail loading facility, either within Queensland or to the Darwin-Adelaide railway, remains an option. However, it is likely to add delays and additional complexity to the freight task, particularly in relation to the specific security, operator licensing and certification, and tracking requirements that apply to uranium transport.

Impact mitigation on Queensland transport network

The Department of Transport and Main Roads (TMR) is typically a referral or advisory agency that participates in the EIA processes managed by the CG or EHP under the SDPWO Act and the EP Act respectively.

From a transport perspective, through the EIA process, project proponents are expected to assess their impacts on state-controlled transport infrastructure and may be required to mitigate these impacts through either works and monetary contributions or road use management measures. This typically includes constructing appropriate access to the mine site, safety related works on affected roads, intersections or level crossings, and contributions towards the cost of increased maintenance or rehabilitation.

Mining projects may also trigger the 'notifiable road use' provisions of the MR Act if it is proposed to haul more than 50,000 tonnes per annum of minerals on state-controlled roads, except if the activity has been declared a significant project by the Coordinator-General. For notifiable road use, the proponent must notify TMR of the proposed haulage. TMR may require the proponent to assess the impacts of the proposed haulage. TMR may then give a road use direction in relation to this haulage and also enter into a compensation agreement with the proponent. Given the expected tonnages of uranium oxide likely to be produced in Queensland, road-based uranium haulage is unlikely to trigger notifiable road use in its own right. However, it may be triggered if any uranium mines will also be producing other minerals.

Identification of ports and shipping options for export

Australia has been shipping uranium oxide out of its ports for many decades. Port Adelaide and the Port of Darwin are the only ports currently permitted to export uranium. This largely reflects the availability of commercially viable shipping lines for uranium given its low volume/high value nature and the relevant safety and security aspects of uranium transport.

Given the relatively small quantities of uranium likely to be exported from Queensland it is unlikely any new shipping routes would be established from this state in the short-term. Submissions from industry have indicated it would be more commercially viable to transport uranium by road for export through either Darwin or Adelaide.

The uranium oxide being exported from Australia over the past few years has largely been exported from Adelaide as the Port of Darwin is currently limited to servicing 'charter' shipments to China. During visits to South Australia and the Northern Territory, the Committee found that both ports would be in a position to accept additional consignments from Queensland and that any requests would be considered within each jurisdiction's existing framework for the transport of uranium oxide, and the security requirements imposed by ASNO.

As part of its considerations, the inter-state committee should review the regulatory environment for transport and logistics to facilitate the road and rail transport task from Queensland mines through those two jurisdictions for export.

Recommendation 4.11

The Committee recommends the focus of Queensland's efforts should be on facilitating the use of existing ports and shipping lanes by industry for the export of uranium.

Given that the uranium mining industry is unlikely to seek to export uranium through Queensland, ports in Queensland should be encouraged to seek additional business from the activity that uranium mining will present in terms of materials supply for construction and maintenance, and mining related goods.

While the expectation of the development of a specific port for the export of uranium oxide located in Queensland would be driven by economic contingencies, it is expected that existing port infrastructure would be utilised for the import of goods related to uranium mining development proposals. These goods and services would include heavy machinery for mining tasks, infrastructure for processing uranium ore into oxide concentrate to chemicals used in this processing activity.

Recommendation 4.12

The Committee recommends that, as the uranium mining industry is unlikely to export uranium through Queensland ports, the Queensland Government should encourage these ports to seek additional business from the activity that uranium mining will present in terms of materials supply for construction and maintenance and mining related goods.

The Uranium Council for the Standing Council on Energy and Resources (the Uranium Council) highlighted in its paper dated December 2012 that it is seeking to increase the available transport routes for shipments of uranium. The Australian Government is also providing ongoing support through DRET to progress a transport strategy for uranium.

The Uranium Council also recommends that it is a priority to increase public knowledge about radiation, and address misconceptions concerning uranium mining and the broader industry such as transport. Ensuring radiation monitoring data is available and published in a consistent manner will increase transparency and trust in industry and government. These issues will have to be adequately dealt with in any future proposal for a licence to export uranium through any new ports.

Internationally, there are growing issues with denials and delays of shipments of uranium by ports, carriers and jurisdictions. The Australian Government and industry continue to work with IAEA, and with other countries to open ports and increase shipping options.

Industry has expressed¹ a need for greater internal access to transport infrastructure and access to additional Australian load ports. Key issues identified by industry include:

- a lack of direct rail access from mine sites to ports
- there is limited infrastructure access
- only two points of export – Adelaide and Darwin means limited redundancy
- only two carriers, sharing limited services from Adelaide
- possibility exists of both carriers merging which could reduce the number of vessels on the current schedule for the Adelaide-West Coast America service
- Adelaide being the end of the line often sees drop offs in services
- Some other carriers still consider the additional regulatory burdens to be too great for the return
- Trans-shipment port issues (government policy prevents trans-shipment in New Zealand, Columbia and South Africa. Australia does not currently have a bilateral agreement in place with Malaysia)

Industry is also encouraging emerging consigners on the need for their support towards their adoption of harmonised approaches to best practice, and promoting the distribution and usage of guidelines and other educationally focused information documents to all key stakeholders throughout regulatory bodies and government agencies, the uranium transport supply chain and the wider community.

While both North Queensland Bulk Ports and the Port of Townsville have expressed interest in exporting uranium in their submissions and the capacity and expertise to do such, it is unlikely that commercial shipping companies would establish new shipping routes through any Queensland ports in the short-term. Vessel owners and shipping companies have become increasingly reluctant to transport Class 7 Dangerous Goods due to increased security and liability issues, insurance costs and the permissions required to carry radioactive materials under the international and national conventions (HRSCIR 2006). As uranium oxide is a low volume - high value product, the volumes for export need to be commercially viable from any Australian port and the right customers with approvals in place ready to accept shipments.

Recommendation 4.13

The Committee recommends that, if the Queensland Government does receive a request to export uranium through a Queensland port, the request should be assessed by the Coordinator-General as a coordinated project and existing regulation for the transport and export of Class 7 Dangerous Goods (Radioactive Material) be applied.

Compliance and monitoring of the transport task on the Queensland network

TMR transport inspectors undertake road compliance operations that support both the safety and security of Queensland's transport system and network. In regard to the

¹ The Committee Secretariat attended a meeting of the Uranium Council Transport Working Group on 31 January 2013 where emerging key transport and export challenges were discussed.

transport of uranium oxide across Queensland's network to licensed ports for export, there is opportunity to expand the role of the TMR transport inspectors to include:

- monitoring transport operator's adherence to their approved transport plan and uranium oxide transportation routes
- compliance to transport permit conditions
- driver and load documentation.

This expanded role would support Queensland Health's existing regulatory and compliance regime for the transportation of radioactive material. These additional activities can occur as part of routine compliance operations in areas where routes are identified for uranium oxide transportation. Existing issues such as vehicle safety, driving hours and fatigue would also be examined for operators and drivers transporting uranium oxide during the compliance process.

To exercise this compliance role, it is recommended that a Memorandum of Understanding (MOU) between TMR and Queensland Health be implemented specifically highlighting the role and powers of the transport inspectors and reporting requirements to Queensland Health as regulator and competent authority. Queensland Health would provide these inspectors with appropriate training if this MOU is exercised.

Recommendation 4.14

The Committee recommends that, as part of streamlining the current regulatory process for uranium transportation, a Memorandum of Understanding (MOU) should be developed between Queensland Health and the Department of Transport and Main Roads (TMR) regarding transport compliance inspections.

4.5 Transport safety, security, and infrastructure

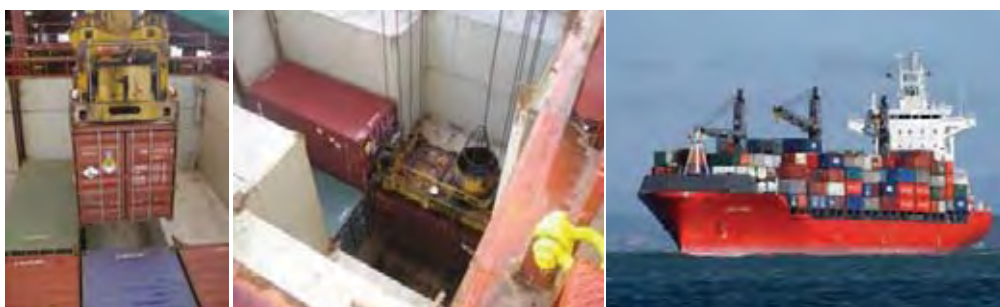
The international transport of radioactive materials is strictly governed under international regulatory regime that includes standards, codes and regulations that have been continually revised and updated over the past several decades (WNTI 2013).

According to the Transport Code, uranium oxide may be transported packaged or unpackaged. The preferred method is for the uranium oxide to be sealed in 200 litre steel drums. Each drum is to have a tight fitting lid secured by a steel locking ring, clamped with a locking ring bolt. The drums are to be stowed securely into 20 foot International Organisation for Standardisation (ISO) shipping containers for road, rail and sea transportation. Drums are secured inside the shipping containers using a webbed Kevlar-based strapping system designed to withstand G-forces during road, rail or sea transportation and handling operations. This arrangement for securing drums is approved and audited by the Australian Maritime Safety Authority (AMSA) for sea transport.

Shipping

Uranium oxide that is stored before or during shipment is to be placed in a secure area with restricted access. Specialised drum lifting equipment is to be used when loading shipping containers.

All stows of uranium oxide are under deck, and there are common approaches by load port vessel planners applicable for both carriers. Under deck stowage also applies for trans-shipments. For small consignments by charter it is possible to stow containers one high above deck.



Transport safety

Globally, the transport of radioactive materials has an excellent safety record. The OECD report (NEA, 2005; p.253) discusses a number of radioactive material transport accidents in the USA 1971-96 and in France 1997-98, and states: “None led to significant contamination or irradiation of workers or the public.”

Uranium oxide is classified as a Class 7 Dangerous Good with ‘low specific activity’ LSA-1 material due to its low-level emission of radiation per unit mass. The strict packaging and transport requirements of uranium oxide mean that radiation exposure is kept to a minimum and the risk of human exposure low. Specific aspects of both worker and human health aspects are described in detail as part of Chapter 6 of this report.

To assist Australian transport workers, the Uranium Council’s Transport Working Group developed and published the comprehensive *Guide to Safe Transport of Uranium Oxide Concentrate (UOC)* in early 2012. The guide is consistent with legislation and codes of practice and consolidates a range of best practice advice and procedures widely applied across the transport sector in handling UOC such as the IAEA *Safety Standard – Fundamental Safety Principles SF-1*. Procedures range from technical information such as material safety data sheets, packaging and labelling and documentation through to radiation protection and incident response. Accordingly, licensed transport operators in Queensland should reflect these available procedures in their Radiation Protection Programme when applying for a transport licence.

In the event of an accident, safety procedures as described in the Radiation Protection Programme will be expected to be applied by transport operators. In Western Australia, current and likely mining proponents collaborated with the Australian Uranium Association to construct the *Guiding Principles for Emergency Response – July 2011*. This document details the role of producers of uranium oxide concentrate, general expectations and conduct, mechanisms for working with emergency services, and the types of plans and procedures recommended for implementation to ensure the safe handling and transportation of uranium oxide concentrate.

Another procedural tool available for use within Australian states and territories currently mining uranium is the *‘Radiation Workers Handbook – Radiation Control in the Mining and Mineral Processing Industry’* which is referred to in detail within Chapter 6. In regard to transport, this handbook provides for uranium transport instructions regarding compliance to ARPANSA *Code of Practice for the Safe Transport of Radioactive Material*

and describes and displays product packaging, labelling and documentation for use by the mining and transport industry workers.

Given that many of Queensland's emergency service workers (including local SES volunteers) are likely not have contemporary experience dealing with uranium oxide, the following should be adopted:

- a similar guiding principles document and recommended procedures for transport of uranium oxide concentrate should be developed and implemented with Queensland context for use by industry and emergency services workers, or a national approach considered
- Queensland Health, as radiation safety regulators, should develop and deliver a training and education program for these emergency workers prior to the establishment of a uranium mine in Queensland.

The available routes for heavy vehicle transportation for commercial uses across Queensland's transport network will likely apply in the case of transporting uranium oxide with activities regulated and monitored through the National Heavy Vehicle Regulator and TMR respectively.

Within other mining sectors in Queensland, such as LNG, a number of transport companies have installed Intelligent Access Programs (such as GPS) that track and record vehicle movements, speed and other tracking information of an evidentiary standard. Transport operators involved in the road haulage of uranium oxide may also wish to consider such programs in order to satisfactorily fulfil their compliance and duty of care requirements.

Recommendation 4.15

The Committee recommends that, as radiation safety regulator, Queensland Health should develop and implement guiding principles for emergency response with the Australian Uranium Association specifically for Queensland, in a similar fashion to that undertaken by the Western Australian Government. Queensland Health should also conduct education and training for emergency workers in relation to procedures for uranium emergency responses.

Transport security

ASNO is Australia's national safeguards and nuclear security authority, responsible for ensuring Australia meets its safeguards, non-proliferation and nuclear security obligations. ASNO issues conditional permits to mine operators for the production, transportation, handling and storage of uranium oxide. Transport of uranium within Australia requires a permit to transport nuclear material, which is granted by the Foreign Affairs Minister pursuant to the *Nuclear Non-Proliferation (Safeguards) Act 1987* (Federal).

Through ANSO, states producing uranium oxide take a robust approach to ensuring the effective control of radioactive material. The security measures cover three distinct areas:

- prevention – protects the uranium oxide being transported from malicious acts
- detection and response – to malicious acts involving uranium oxide
- information coordination and analysis – providing information on export quantities, movements, arrivals at destinations etc.

Each transporter of uranium in Australia must submit a transport plan to ASNO. Transporters may wish to submit a single transport plan, detailing all the stages of the transport process (transportation from mine site, to storage site, to port, to overseas country); or submit individual transport plans for each stage of the transport process. ASNO also approves each shipment of uranium oxide to depart the mine site and for export.

Each individual shipment of uranium leaving Australia must have prior approval from DRET, ASNO and Customs before it can leave Australia, and a tracking system in place for every stage of the process for assurance. In addition, ASNO must approve the ship (that must comply with IAEA security and safety standards as well as the IMDG Code) and application made to transfer the uranium internationally.

Under the 2007 COAG *Recommendations of the Report on the Regulation and Control of Radioactive Material*, there is a recommendation encouraging the states and territories to develop memoranda of understanding with ASNO to assist in reducing duplication across jurisdictions. Queensland may be able to assist ASNO with assessment of plans and monitoring of transport by incorporating all of ASNO's requirements into the Radiation Protection Programme required under the *Radiation Safety Act 1999*. Criminal history checks are conducted on all individuals applying for licences under the *Radiation Safety Act 1999*.

While transport security for uranium is currently overtly required by ASNO, it is possible to invoke the significant security arrangements under the *Radiation Safety Act 1999* by an amendment to the *Radiation Safety Regulation 2010* to include uranium oxide concentrate as a 'security enhanced source'. Given the rigour of the ASNO process, the Committee does not recommend the use of these powers to impose additional, state based security regulations for uranium.

In the event of a deliberate attack on the transportation of uranium oxide, the existing State Radiological Disaster Plan may be triggered under Queensland's Chemical, Biological, Radiological and Nuclear Disaster Plan.

Transport infrastructure

Given the location of the current uranium deposits in Queensland, primarily around Mt Isa extending to the Northern Territory border, the Georgetown area, and Ben Lomond (approximately 50 kilometres west of Townsville), the rail and road transport route options are likely to be the Barkly Highway (Cloncurry-Mt Isa-Northern Territory), Flinders Highway (Cloncurry-Townsville) and the Great Northern Line corridor. The Barkly Highway link forms part of the National Land Transport Network (Brisbane to Darwin corridor) with the Flinders Highway forming the Townsville to Mt Isa corridor^{T9}.

The Barkly and Flinders Highways support a range of interstate, intrastate and local functions including:

- providing the main link in the import/export supply chain for Queensland's North West Mineral Province, and for the agricultural industries in north Queensland
- providing the major transport route between rural and remote communities and the major activity centres of Mt Isa and Townsville
- providing a tourist route known as 'Overlanders Way' allowing visitors to experience the attractions of outback Queensland
- providing 'pit to port' access for road trains to the Port of Townsville, following the completion of the Townsville Port Access Road.

With these highways supporting a range of uses, including a tourist route, the important aspect of community education on the safe transport of uranium oxide is paramount along the complete route from pit to port. Dangerous goods labelling on vehicles is prominent and may attract unwarranted attention by those ill-informed of the safety and security of the consignments. As detailed in Recommendation 4.8, the development of community education programs should be initiated.

Furthermore, the road network to the export port in question would require assessment if there are any limitations in moving the freight. However due to the relatively low tonnage of uranium oxide being moved across the supply chain, it is unlikely that road infrastructure investment specifically due to uranium mining would be triggered.

A recent investigation by the Australian Bureau of Transport Safety in late 2011, as a consequence of a train derailment on the Adelaide to Darwin line (Edith River rail bridge) concluded that transport operators must have robust systems in place to monitor and mitigate the risks of severe weather events, to ensure the safety of rail operations is not compromised (ATSB 2011).

The Edith River incident involved an event greater than the 100 year Average Recurrence Interval (ARI) with the bridge suffering damage, resulting in a train derailment. Given the monsoonal conditions frequently experienced in north and north west Queensland, and the impact of flooding on the transport network, the transport plan submitted to regulators should outline the assessment of potential impacts of severe weather conditions and mitigation measures identified, implemented and monitored.

5. Environmental impacts and protection

5.1 Key environmental impacts of uranium mining

In most respects, the environmental considerations for a uranium mine are the same as those for other metalliferous mining operations, for example, gold and copper mining. Like any other mining project, there are a number of stages to the development of a uranium mine, and there are specific, but often overlapping, environmental considerations at different stages of the mine's lifecycle.

These stages can be broadly summarised as:

- exploration
- deposit evaluation and mine planning
- mine construction
- mine operation
- rehabilitation
- mine closure and decommissioning.

As with other metalliferous mining, uranium mining can have significant impacts on the environment, however, a good regulatory system will ensure the risks from uranium mining are managed and minimised by the operators. In general, metalliferous mines can cause impacts because of:

- land clearing resulting in loss of species and habitat
- waste rock dumps and associated acid mine drainage
- tailings dams and potential leaching to groundwater, failure of dam or overtopping
- voids (pits and mine shafts) and associated groundwater impacts (for example cones of depression) and mine closure issues
- groundwater impacts from in-situ recovery (ISR) operations or leaching from tailings dams
- surface water impacts from dewatering flooded pits.

The following discussion does not constitute an assessment of all potential impacts as outlined above, but rather is focused on issues that are:

- relevant to uranium mining in the Queensland context (for example water management in areas with highly seasonal rainfall events and servicing of remote mines)
- significant in the context of uranium mining generally (for example radiation protection).

On this basis the following environmental themes are considered the most relevant to the recommencement of uranium mining in Queensland and are further expanded on in this chapter:

- use of outcome-based approvals and conditions
- surface water management
- ISR operations
- radiation protection (including air and dust)
- rehabilitation requirements (including agricultural productivity and native ecosystems)
- compliance and enforcement

- ongoing consultative mechanisms, for example, consultative committees.

5.2 Best practice environmental management

The community expects mining to be carried out to the highest environmental standards. This is particularly the case regarding mining operations that are unique or, as with uranium mining in Queensland, unfamiliar in recent times. The Queensland Government has recognised this community expectation in the way Environmental Authority (EA) applications for mining proposals are assessed. All mining proposals in Queensland are assessed against the standard criteria which are contained in Schedule 4 of the *Environmental Protection Act 1994* (EP Act). The standard criteria include Best Practice Environmental Management (BPEM) and technologies associated with achieving BPEM. The key concepts of the standard criteria are applied during the assessment and conditioning of the EA. As described previously in this report, the EA contains the operational rules a company must operate under at each mine site.

BPEM is the best possible way of conducting activities for a given site so that the impact on the environment is minimised. As new challenges emerge and new solutions are developed, or better solutions are devised for existing issues, it is important that BPEM be flexible and innovative in developing solutions that match site specific requirements.

The Department of Environment and Heritage Protection (EHP) expects mining operations to implement all reasonable BPEM strategies. It should be noted, however, that BPEM techniques can have significant financial implications and the benefits of BPEM need to be considered in tension with such costs. Where the resulting environmental benefit is marginal but comes at significant cost it may be decided that financial resources are better redirected to activities that can achieve more significant environmental outcomes.

As BPEM changes with the development of new technologies and techniques, it is important that specific technologies and techniques are not mandated in approvals as this may constrain the ability for a mine to take up and incorporate new and better environmental solutions over time. Rather, the approach used by EHP in the assessment of mining operations is to condition for the outcomes that can be achieved using BPEM. This concept is further explored in section 5.3 – Outcome-based approvals.

Clear guidance on what constitutes BPEM in mining is provided by the Australian Government's Leading Practice Sustainable Development Program for the mining industry. This program has developed a series of handbooks regarding BPEM in mining, many of which are directly relevant to uranium mining. Further, the Australian Government has recently published a best practice guide for ISR uranium mining in Australia. These, and other relevant publications, are currently considered as a key information resource for mining in Queensland and this will continue with the recommencement of uranium mining.

5.3 Outcome-based approvals

Modern rationale for outcome-based approvals

Uranium mining approvals (including the EA and transport licences) are issued with conditions. Conditions of such regulatory approvals fall on a continuum between outcome-based conditions (which focus on what should be achieved) and prescriptive conditions (which focus on how to achieve the objective).

Traditional approvals have relied on prescriptive conditioning (sometimes known as ‘best available control technology’ requirements), however modern regulation recognises such a strategy:

- stifles innovation by removing incentives to look for and implement better alternatives (EHP 2012b)
- increases risks to government through outcomes not being achieved (CoA 2010)
- increases costs to industry through reduction of options for meeting compliance (EHP 2012)
- increases pressure on and diverts government and industry resources (Hayter pers comm).

The Council of Australian Government’s (COAG) (2007) has endorsed regulation in Australia to be more outcome-focused. In the context of approvals for uranium mines, this can be restated that approvals should use outcome-based conditions instead of prescriptive conditions. However, COAG (2007) does caution that the use of prescriptive conditions may be unavoidable for approvals that deal with public health and safety, such as radiation protection.

Moving from a regulatory system based on prescriptive conditioning to a more outcome-focused regulatory system is a process rather than a declaration. The change to a regulatory system based on outcome-focused approvals requires changes on the part of the regulatory (government) and regulated (industry) organisations.

Box 1 Air release outcome-based condition

Outcome-based conditions provide industry the flexibility to achieve environmental outcomes using current leading practice environmental management rather than being locked in to particular ways of meeting the conditions at the time the approval was originally granted.

EHP is currently developing a set of model environmental authority conditions for mining that are outcome-based. In this program, for example, outcome-based conditions for air quality would set maximum limits for the release of air contaminants, but allow the mine operator to determine the best method to meet those limits. By contrast, prescriptive conditions would specify the method of achieving the release limits such as the location of release points and emission rates.

The Queensland context

In the last 12 months, the Queensland Government has commenced a change process towards outcome-based approvals that is rapidly gathering pace (see Box 1 – Air release outcome-based condition). This process commenced with the development of a set of model mining conditions (EHP 2012d; EHP 2012e) and has progressed to a commitment for further development during 2013 (DPC 2013; EHP 2012a, EHP 2012). The mining industry in Queensland, particularly large mining companies, have accepted outcome-based approvals and actively advocate for, and are more progressed in, this change process than other industry sectors (Deloitte 2008).

This change in the regulatory strategy of EHP will facilitate the re-prioritisation of resources to focus on the monitoring of performance and responding to performance of all regulated industries, including uranium mines (DEHP2012a). This includes more proactive compliance inspections and an increased emphasis on the use of fair but firm enforcement measures (issues which are further addressed in section 5.8 below).

The change in regulatory strategy described will have impacts on how a nascent uranium mining industry is regulated in Queensland. The development of outcome-based model conditions should be conducted in recognition of this likely recommencement of uranium mining in Queensland. This need is relevant to all the remaining considerations in this chapter but particularly for water management (section 5.4) and ISR operations (section 5.5). These considerations are revisited in these sections respectively.

In addition to model licence conditions, site specific conditions are also likely to be required for uranium mines. Under the EP Act, when deciding an application for an EA, the administering authority (EHP) considers a range of issues including BPEM. In considering BPEM under an outcome-based regulatory strategy, EHP would not condition to require the use of specific BPEM options but condition for the outcomes that must be achieved using BPEM. For example, noise attenuation can be achieved via engineering solutions but EHP does not stipulate the engineering solutions to use in noise attenuation. Rather, noise output levels that are achievable using said engineering solutions are specified in conditions of the EA.

Recommendation 5.1

The Committee recommends that, in line with the Queensland Government's commitment to develop outcome-focused model conditions for mining approvals, model conditions developed for Environmental Authorities (EA) should be reviewed for relevance to the uranium mining industry and where necessary model conditions specific to uranium mining should be developed. The model conditions for EAs should consider best practice environmental management and focus on achieving positive environmental outcomes rather than specifying prescriptive measures.

5.4 Water management

In conventional uranium mines, i.e. open pit and underground mining, water management is likely to be the most significant environmental management issue (IAEA 2009) and is likely to be even more challenging in the Queensland context due to a range of factors including:

- Highly seasonal rainfall - in the winter months water for processing could potentially be a factor constraining production while summer rains in Queensland can lead to flooding, loss of production and contamination of nearby waterways.
- Many streams and waterways in areas likely for uranium mining have ephemeral flow regimes. The ephemeral nature of waterways can exacerbate the effects of incidental or deliberate discharges to waterways.
- Co-occurrence of other minerals - uranium ore bodies often contain elements (and compounds of elements) that are not commercially extractable. When exposed these materials can be leached from the ore and potentially be released to surrounding waters.

Water in uranium mining is required for dust suppression, cooling, equipment wash down, slurry conveyance, extraction processes and personal use (AUA 2011). Uranium mines, like many other mines in Queensland, are likely to be established in areas where water supplies can potentially be restricted, hence efforts must be made to capture and use water efficiently. Conversely, during periods of intense rainfall mine pits can become flooded with water. If this water cannot be managed and removed from the mine pit it will ultimately result in an interruption to operations and economic losses to the company, the state's economy and the local community. Further, if the water is allowed to remain in the pit, the level of contaminants from the surrounding ore body (including radionuclides) may build up. If that water is then released to the environment following a long period of time, it could result in environmental harm.

Planning for water management

The most effective means of water management for a mine is via initial planning, for example, during an environmental impact statement (EIS). Proper planning for water management requires knowledge of the environmental values that require protection and of regional rainfall and climatic conditions. Water balances, which include a wide variety of predictable flood intensities and drought conditions, may then be conducted to model the need for and impact of releases on local waterways.

Most mines will have a relatively long operational life, in the order of 30 plus years. Robust scenario planning, as described above, would include a sensitivity analysis for a range of rainfall and flooding events that a mine is likely to experience over this expected operational life, including the effects of climate change on rainfall and drought intensity. The output of this scenario planning may be to increase expenditure on water management infrastructure, however, this is likely to result in long-term operational savings through minimising lost production and environmental costs.

Operational planning for water management

After initial planning, the next most effective means of managing water is through operational planning. Operational planning is effective when a mine's planning documents, for example, the plan of operations and water management plans, foresee likely and possible events and include strategies for dealing with such occurrences. EHP has developed guidance material including the *Guideline – preparation of water management plans for mining activities* and *Guideline – preparing a plan of operations and audit statement for level 1 mining projects* (EHP 2012f; EHP 2012g) to assist mine operators to develop water management plans.

Conditions of environmental authorities also have a crucial role to play in operational planning by ensuring a mine has the necessary capacity to manage mine water during intense flood events. Conditions of approvals should be outcome-focused and set in stream flow parameters, for example, quality and quantity, which should be protected during the operations of the mine including during discharges (EHP 2012e).

As discussed in section 5.3, EHP is now developing model environmental authority conditions which are outcome-focused. The development of these conditions should proceed cognisant of the recommencement of uranium mining in Queensland and the management of water at uranium mines.

Recommendation 5.2

The Committee recommends that the initial and operational planning stages of a uranium mine must consider the potential water quality impacts of mining and should specify how water quality will be protected during high rainfall events that may be expected during the life of a mine. Specific consideration should be given to the effects of climate change on the scale and frequency of rainfall events and the potential mobilisation of radionuclides that may impact on environmental values.

5.5 In-situ recovery (ISR)

Since it was first developed in the 1970s ISR has grown to account for more than 28 per cent of the world's uranium production (CoA 2010). In the Australian context the main area of ISR for uranium is in South Australia. While it is recognised that ISR is highly unlikely to be undertaken on uranium resources already identified in the Queensland jurisdiction, it is nevertheless possible that other resources will be discovered that lend themselves to extraction via ISR. Where ISR has been used it has often been regarded by the community as controversial (Mudd 1998).

Like other mining operations, ISR is not immune to problems and difficulties and does have an inherent level of environmental risk. The distinctive environmental risk posed by ISR is the potential for groundwater resources to be contaminated by lixiviant and/or minerals mobilised from the ore body (CoA 2010). Groundwater that can potentially become contaminated includes that of the containing ore body (e.g. water saturated permeable sands mineralised with uranium), or nearby aquifers (as a result of poor vertical solution confinement) (Mudd 1998). Groundwater resources in western Queensland are extremely

important for irrigation and stock watering with approximately 1500 megalitres of water per day being drawn from the Great Artesian Basin alone (DERM 2011). Due to the importance of these groundwater resources, any potential for groundwater impacts from ISR activities need to be assessed with extreme care.

ISR does, however, have advantages over open-cut and/or underground mining techniques. ISR results in much less surface disturbance, it does not involve tailings, waste rock dumps, or open pits, and the processing plant is small and easily removed after the completion of mining. Further, ISR prospects identified in Australia to date (South Australia, Western Australia and Northern Territory) are in arid regions with low topography. The groundwater in these mineralised areas tend to contain naturally elevated concentrations of uranium and its decay products and are slower flowing than is the case for known deposits elsewhere (CoA 2010; Mudd 1998).

For the reasons outlined above it is necessary to ensure that the regulatory environment in Queensland is able to manage proposals in the future that may involve ISR. The Australian Government (2010) has recently produced a best practice guide for ISR of uranium. It is considered appropriate that this guide be used in the Queensland context to ensure ISR operations are conducted using best practice. The table below lists the best practice principles that should be adopted for ISR uranium mining. Further details regarding these principles can be found in the Australian Government report.

Table 1: Principles for best practice ISR uranium mining (from CoA 2010)

1.	An ISR mining proposal should be based on a full understanding of the hydrological/hydrogeological/hydrogeochemical features – including features indicating favourability for ISR mining, the current and potential uses and values of groundwaters and natural radioactivity in the project area and environs.
2.	The nature of the uranium mining solution and well field design should be matched to the site characteristics, particularly the minerals and groundwaters in the uranium mineralised aquifer.
3.	Mining should not compromise groundwater in the mineralised aquifer to the extent that it cannot be remediated to meet the agreed post-mining use at mine completion. At no stage should mining compromise groundwater use in the mineralised aquifer outside an agreed distance (not exceeding a few kilometres) or groundwater travel time from a mined area. Other aquifers present in or around the mine lease should not be affected by ISR mining.
4.	Radiation protection should be integrated into all facets of the mining, rehabilitation and mine completion planning. Best practice radiation protection is covered by the <i>Code of Practice and Safety Guide on Radiation Protection and Radioactive Waste Management in Mining and Mineral Processing (2005)</i> .
5.	The impact assessment process should lead to the best option for dealing with liquid residues: <ul style="list-style-type: none"> • injection into deep aquifers containing poor quality groundwaters that have no foreseeable use • injection into former mining well fields for dispersion, attenuation and/or containment • evaporation to solid residues and disposal on site (or at a low level radioactive waste repository).
6.	Monitoring wells should be located so as to demonstrate effective containment of mining solutions and liquid residues (where present) within the mining aquifer and

provide early warning of any excursions. Monitoring of groundwater pressures and quality should be conducted for all other aquifers in the area to verify they have not been affected by the ISR mining.
7. Solid radioactive residues generated on an operational ISR mine site should be managed as low level radioactive waste and disposed of in an approved disposal facility.
8. For lease relinquishment, regulators should be confident that: <ul style="list-style-type: none"> • the rehabilitated site does not present any significant radiation exposure risks • impacts on groundwater quality are within agreed parameters which reflect future land uses • there have not been and, will not be, impacts on any other aquifers at the mining lease or beyond • the lease and surrounding area is left in a state fit for agreed future land uses. <p>Best practice entails being able to demonstrate that completion criteria will be achieved within an agreed reasonable period (typically less than ten years after cessation of mining).</p>

Using these principles, the onus is on the operator to determine which technologies and approaches should be used at a mining operation to ensure that the environmental outcomes agreed with government authorities are met and radiation protection standards are adhered to. As discussed in section 5.3, EHP is developing model environmental authority conditions which are outcome-focused. The development of these conditions should proceed cognisant of the recommencement of uranium mining in Queensland and the (low) potential for the use of ISR techniques at uranium mines.

Recommendation 5.3

The Committee recommends that the Australian Government's leading practice guidelines should be used to manage and minimise the risks associated with in-situ recovery. Any proposed in-situ recovery operation must be considered with regard to potential impacts upon groundwater resources generally and the Great Artesian Basin particularly.

5.6 Radionuclide protection

Background to radionuclides in uranium mining

Uranium mining has an additional concern compared with other metalliferous mines – the potential for an increased release of radionuclides into the environment. The principal sources of radionuclides from uranium mining and milling are waste rock, low grade ore and tailings (Mudd 2003). These sources of radionuclides will remain at the mine site long after the mine has closed due to the long half-lives of many of the radionuclides, for example, the half-life of ²³⁸U is 4.5 billion years (Argonne National Laboratory 2005).

Until recently, it has been assumed that if humans were adequately protected from the potentially harmful effects of radiation, then wildlife in natural habitats would also be protected. This approach is no longer considered to be consistent with international best

practice and Australia is now developing guidance material on radiation protection of wildlife in natural habitats. ARPANSA expects to issue this guidance during 2013.

The Uranium Mining Oversight Committee (UMOC) should ensure that the protection of wildlife is adequately addressed within the regulatory system for uranium mining in Queensland.

The radionuclides in the Earth's crust that contribute most radioactivity (with typical levels of radioactivity per kilogram of soil) are Potassium 40 (400 becquerels per kilogram), Radium (48 becquerels per kilogram), Thorium (40 becquerels per kilogram), Uranium (25 becquerels per kilogram) and Radon (10 becquerels per kilogram) (Idaho State University). While these elements are ubiquitous in the Earth's crust, freshwater and oceans it is only present in economically recoverable concentrations in ore deposits at discrete locations. All uranium isotopes are radioactive, with the most common isotopes in natural uranium being ^{238}U (99.27 per cent), ^{235}U (0.72 per cent) and ^{234}U (less than 0.01 per cent) (Argonne National Laboratory 2005).

Regulatory responsibilities for radiation control

The environmental regulation of various aspects of the uranium mining industry is conducted by a range of agencies. These agencies include EHP for the regulation of environmental impacts from the mining and ore processing operations and Queensland Health (QH) and the Department of Transport and Main Roads (TMR) for the regulation of the transport of the processed uranium.

The regulatory responsibility for the closure and rehabilitation of mines in Queensland and the associated assessment of land contaminated by radionuclides rests with EHP under the EP Act. A Memorandum of Understanding (MOU) between QH and EHP, signed in March 1999, recognises that the expertise for radionuclide assessment resides in Queensland Health's Radiation Health Unit (Radiation Health) and the assessment of land contaminated by radionuclides (including uranium) would therefore be carried out by Radiation Health on behalf of EHP.

This MOU for the assessment of land potentially contaminated by radionuclides was drafted in the absence of a uranium mining industry. As such, it does not address the technical expertise that Radiation Health could bring to bear during the operational phase of a uranium mine.

A partnership arrangement between EHP and Radiation Health for the assessment of EA applications and the operational management of uranium mines would ensure:

- better regulation over the life of a mine and minimisation of the levels of site contamination
- lower contamination levels and therefore lower remediation costs
- sites are more likely to be able to be fully decontaminated or have discrete contaminated cells fully encapsulated
- increased levels of regulatory coordination and less risk of regulatory duplication.

A partnership between EHP and Radiation Health could be facilitated by way of an expanded MOU or by the participation of both agencies in a technical reference committee.

Recommendation 5.4

The Committee recommends that the MOU between EHP and Queensland Health should be reviewed with the aims of:

- **recognising that uranium mining is likely to be conducted in Queensland in the future**
- **incorporating the expert advice of Queensland Health's Radiation Health Unit in the assessment and regulation of uranium mines in Queensland.**

5.7 Rehabilitation requirements

Background to mining rehabilitation

Similar to other industries, a mining operation may cease when production costs exceed returns or as a result of an unrelated management decision. However, unlike most other industrial activities, mining operations, including uranium mines, are all expected to cease in the foreseeable future. This generally occurs when a mine's finite resources are depleted.

The closure of a mine provides opportunities for land disturbed by mining to be rehabilitated to one or more sustainable land uses. Recent technological advances and changing market conditions have facilitated increased production at existing mines and the development of many new mines including, potentially, new uranium mines.

There have also been changes in community expectations about the management of the impacts of mining, the rehabilitation of ceased mining operations and the management of any residual risks. The regulation of mines (including provisions for rehabilitation) of mines has been administered under the EP Act since 2001. The rehabilitation of a uranium mine, and regulatory requirements thereof, will be similar to that of other metalliferous mines.

In assessing the acceptability of rehabilitation objectives, indicators and completion criteria that may be proposed for a mining project, the administering authority will have regard to a hierarchy for mine rehabilitation. The outcomes listed higher in the hierarchy are preferred to those listed lower, unless there are significant environmental, economic or social issues that override such a selection. The rehabilitation hierarchy is:

- avoid disturbance that will require rehabilitation
- reinstate a 'natural' ecosystem as similar as possible to the original ecosystem
- develop an alternative outcome with a higher economic value than the previous land use
- reinstate previous land use (e.g. grazing or cropping)
- develop lower value land use
- leave the site in an unusable condition or with a potential to generate future pollution or adversely affect environmental values.

The Queensland Government's policy objectives for rehabilitation are called rehabilitation goals. There are four general rehabilitation goals which are:

- safe to humans and wildlife
- non-polluting
- stable
- able to sustain an agreed post mining land use.

In addition to these general goals there may be site specific goals. These may be indirectly identified by government through requirements under other legislation dealing with matters such as endangered species, water, registered heritage places or regional or local planning.

Rehabilitation objectives are selected by mining companies that provide a clear description of proposed rehabilitation outcomes within the individual domains in the mine site. The rehabilitation program for a mine must address the general rehabilitation goals and any relevant site specific goals. The rehabilitation objectives must:

- address potential environmental impacts
- achieve the highest practicable level in the rehabilitation hierarchy
- identify post mining land uses that are acceptable to the community, local government and any other relevant stakeholders.

Rehabilitation indicators then provide defensible measurements of progress towards the rehabilitation objectives. Environmental indicators may involve the measurement of a single parameter or they may involve the amalgamation of measurements of several parameters into an index or model. There could be several indicators for one objective and one indicator may be relevant to more than one objective.

Queensland, like most jurisdictions around the world with a significant mining sector, has abandoned and poorly rehabilitated mine sites. These sites have poor rehabilitation for a variety of reasons including:

- the mine was abandoned with rehabilitation never having been attempted
- the rehabilitation was of a poor standard
- the rehabilitation deteriorated over time
- while being best practice at the time of rehabilitation, community standards have since moved on and the rehabilitation standards are currently not accepted by the community.

High profile examples of mine sites in Queensland that are not remediated or poorly remediated include the Mt Morgan Copper, Gold and Silver Mine and Mt Perry Copper Mine in Central Queensland and the Mary Kathleen Uranium Mine in north west Queensland (see Box 2 – Mary Kathleen Uranium Mine case study).

Rehabilitation in the context of uranium mining

Tailings, waste rock and water management will be the most challenging issues in terms of achieving good environmental performance during and post the operational life of a uranium mine. The development of final land use and decommissioning plans prior to the start up of a uranium mine, which are continually reviewed and evolve with changing circumstances

during the operation of the mine, is critical to the successful closure and rehabilitation of a uranium mine (IAEA 2009).

A number of uranium mines around the world have been, or are being, successfully rehabilitated. Rabbit Lake, Canada and the WISMUT SAG/SDAG Wismut uranium mines in East Germany are examples of mines that are currently being successfully decommissioned based on plans developed at start up and in hindsight respectively (Schmidt 2010 and IAEA 2009). To date the Nabarlek mine in the Northern Territory is the only example worldwide of a conventional uranium mining operation which has started up and been decommissioned according to plans developed at start-up and refined as part of the operating strategy. Nabarlek is also an example of the ability to successfully rehabilitate a mine in a tropical climate (IAEA 2009).

Box 2 Mary Kathleen Uranium Mine case study

The Mary Kathleen Uranium Mine is located near Mt Isa in north west Queensland. The mine was the last operational uranium mine in Queensland prior to the prohibition of uranium mining.

Mining at Mary Kathleen has left an open pit with an area of about 25 hectares and a depth of 230 metres. The tailings storage facility (TSF), located approximately 1.5 kilometres from the mill, has an area of 30 hectares. During its operational life, water from the TSF was decanted into evaporation ponds with a total area of some 60 hectares. The waste rock piles and ore sorter rejects occupy an area of approximately 64 hectares (IAEA 2009).

Today the pit is essentially unremediated and filled with water to a depth of approximately 50 metres. The TSF was covered with a 0.5 metre layer of compacted soil/clay mixture and a one metre layer of rock and seeded. The waste rock piles were leveled and covered with a layer of material to promote growth and attenuation of radionuclides (Lottermoser 2011; Lottermoser *et al* 2005).

Since the closure of Mary Kathleen, studies (e.g. Lottermoser 2011; Lottermoser *et al* 2005; Lottermoser and Ashley 2005) have established ongoing environmental legacy issues including:

- seepage of acidic, metal rich, radioactive waters from the base of the tailings dam retaining wall into the former evaporation ponds and local drainage system
- surface waters downstream of the TSF with concentrations of contaminants that exceed the Australian water quality guideline values for livestock drinking water
- colonisation of rehabilitation areas with weed species including the metallophyte *Calotropis procera* (which reduces the grazing potential of the area) and *Aerva javanica*.

Subsequent to the operation and remediation of the Mary Kathleen mine a number of administrative and regulatory changes have been introduced to ensure mines (including uranium mines) do not leave ongoing legacy issues. These changes include:

- the development of an environmental approval system under the EP Act including provisions for conditioning approvals, assessing compliance and taking of enforcement action for non-compliance
- provisions for the Queensland Government to require a financial assurance to ensure remediation is undertaken properly, to a high standard and complies with relevant completion criteria
- provisions for the Queensland Government to retain a component of the FA as a payment for any residual risk that may remain after a site has been rehabilitated.

The recommencement of uranium mining may provide commercial opportunities to explore resource potential at Mary Kathleen including reworking the tailings to extract rare earth metals and remaining uranium. This interest, under the current regulatory framework, could provide a solution to the current environmental issues at Mary Kathleen by requiring rehabilitation of the site as a condition of gaining access to the resource.

Nabarlek, however, also has lessons that can be learned for uranium mining in the Queensland context. Closed uranium mines still require a period of active management and resolution of the long-term stewardship of the site (IAEA 2009). To overcome these post closure issues, it will be necessary to ensure mines are rehabilitated effectively and that active ongoing site management issues are addressed prior to closure.

Features of a regulatory system that will facilitate remediation include:

- a strong environmental regulator who can give conditional approval for the mine, assess compliance with conditions and take action for non-compliance
- a system of security deposit to cover any rehabilitation not conducted or harm caused by non-compliance with the conditional approval
- a system that promotes progressive rehabilitation for example, by enabling security deposits to be proportionally returned based on rehabilitation during the operating life of a mine
- the ability to retain a security deposit after the closure and remediation of a mine to address any residual issues that may remain.

To ensure mines are rehabilitated at the end of their life (when the value in the mine is significantly reduced relative to the risk it poses), the Queensland Government requires financial assurance (FA). FA is a security held to ensure compliance with conditions of an EA and to meet any costs or expenses (or likely costs or expenses) incurred in taking action to prevent or minimise environmental harm or to rehabilitate or restore the environment in relation to the activity for which FA has been given.

An FA for a mining lease (ML) is determined by the administering authority on a site by site basis and is based on third party costs to rehabilitate land that is disturbed as a result of the mining project as described in the current plan of operations for the mine. The required FA may be lodged after the grant of the EA and mining tenement but must be lodged before the carrying out of any mining activities.

The FA may be amended during the life of a mine by application from the holder of the EA when a new or revised plan of operations is lodged. The administering authority may also amend the financial assurance at any time although usually when a new plan of operations is lodged or following an audit of the mining activity. These amendments may be to increase or reduce the amount of FA held because the amount of disturbance has increased or decreased (through progressive rehabilitation) respectively.

In addition to rehabilitation at the end of a mine's life, the EP Act facilitates the rehabilitation of disturbed areas progressively during the life of a mining project. Progressive rehabilitation has the advantages of:

- satisfying community expectations and government requirements
- reducing project costs and allowing other savings on project resources by maximising the use of on site resources (including plant and expertise)
- minimising areas of potential soil erosion, dust nuisance, water contamination and aesthetic impacts and the resultant adverse off site environmental effects
- minimising the FA required to be held in abeyance until the completion of the mining project.

EHP has well developed guidance material available regarding rehabilitation, progressive rehabilitation and FA (EHP 2012h; EHP 2012i; EHP 2012j; EHP 2012k; EHP 2012l). This guidance material, however, was prepared in the absence of a uranium mining industry and may require updating to reflect the intended recommencement of the industry in Queensland. For example, ARPANSA is currently developing guidance material on the protection of wildlife in natural habitats, which is expected to be published in 2013 (Johnston 2012; Doering 2010).

Should a mining operation become abandoned prior to final rehabilitation or the mine operator refuse to satisfactorily rehabilitate the site, the Queensland Government can draw on the FA for the rehabilitation of the site by a third party.

As waste rock and tailings will require active management post closure of a uranium mine an assessment of the long-term residual risk of the site must be undertaken to establish requirements for residual risk payments. The provisions for residual risk payments in Queensland have had very limited use until now. However, every application for an EA must include an environmental risk assessment and expected ongoing costs of monitoring and managing likely residual risks associated with the sites rehabilitation. A residual risk payment is determined from this assessment. Normally a monitoring and maintenance program would not continue for more than 30 years. If the risk is predicted to continue for longer than 30 years, justification may need to be provided why the rehabilitation should be accepted as satisfactory.

Recommendation 5.5

The Committee recommends that EHP should review uranium mining rehabilitation guidance material, with particular consideration to the need for rehabilitation goals, objectives and completion criteria, specific to uranium mining.

5.8 Compliance and enforcement

EHP has a well developed regulatory strategy designed to increase the focus on effective and targeted compliance activities. This strategy acknowledges the growing importance of building an improved voluntary compliance culture within industry by setting clear expectations about acceptable standards of environmental performance and publishing of guidance material and information about how to meet those expectations.

EHP's regulatory strategy is unpinned by strong legislative tools in the EP Act and when a choice is made not to comply with obligations, EHP is also able to take strong enforcement action to provide assurance to the community that failing to meet environmental obligations will not be tolerated. The Ben Lomond project near Townsville demonstrates the current ability of EHP to set conditions for uranium approvals, assess compliance and to achieve environmental outcomes (see Box 3 – Ben Lomond Project case study).

Environmental compliance and enforcement is a regulatory continuum that commences prior to any approvals being applied for as outlined in DEHP (2012a). In this continuum:

1. EHP starts with the setting of standards by developing and publishing relevant guidance material to assist clients to make applications and meet the required standards. This

guidance material is prepared in consultation with the community and peak industry groups. Much of the guidance material prepared generically for the mining industry will be relevant to the uranium mining industry, however there may be a need for guidance material specific to the uranium industry. As the uranium specific issues are likely to relate to radionuclides Radiation Health is likely to be best placed to develop this material.

2. Applications must contain sufficient information to assess the risks posed by the activity. Environmental outcomes the client must meet are set by imposing outcome-based conditions. The Queensland Government will take information supplied by clients at face value and assess applications on this basis. Where information supplied is subsequently found to be inaccurate or misleading, enforcement action, including prosecution, may be taken.
3. To ensure environmental outcomes are achieved and that the community is confident about uranium mining in Queensland, it will be essential that regular performance monitoring of uranium mines is conducted. This should be a focus of the regulation of uranium mines into the future. The discovery of non-compliance issues should also be a trigger for more frequent and targeted compliance monitoring. Performance monitoring is carried out by the mine operator and with checks by the administering authority or a third party auditor as discussed below.
4. The Queensland Government is committed to a fair regulatory system. However, firm regulatory action, in accord with relevant published guidelines will need to be taken when a mine fails to meet required obligations or breaks the law. The publication of compliance alerts and prosecution bulletins will also provide the community with comfort that the uranium industry is being well regulated.

In-house government technical expertise

Despite the strategy above, the Queensland Government has not regulated the mining of uranium since the closure of the Mary Kathleen mine. As a result, the Queensland Government has not actively recruited staff to provide advice to industry on the environmental management of uranium mining or to undertake EA compliance assessments. Further, uranium mining is likely to be located in remote areas of the state that will be difficult to service effectively and efficiently. Nevertheless, as discussed above, it will be a community expectation that a robust compliance and enforcement strategy exists for the uranium mining industry.

Box 3 Ben Lomond Project case study

The Ben Lomond Uranium-Molybdenum Project is located approximately 50 kilometres west-south-west of Townsville. The ore body was discovered in 1975 and subsequent exploration defined reserves of 1.93 million tonnes of ore at 0.2 per cent uranium and 0.15 per cent molybdenum. Between 1979 and 1981, an adit was driven into the ore body to obtain a 3,500 tonne bulk sample for metallurgical testing. Approximately 500 tonnes of this sample was removed to France for metallurgical assessment while the remainder was stored (and currently remains) on site.

Reports indicate that in approximately 1981, during an extremely heavy rainfall event, material from the unprocessed ore sample was released into nearby waterways. Tests at the time demonstrated high levels of radiation in Keelbottom Creek, however it was unclear if these results indicated contamination or were representative of natural mineralisation in the area. Concurrent testing in the drinking water supply at Charters Towers weir demonstrated acceptably low levels of radiation.

In 1984, the Ben Lomond EIS was accepted by both the Queensland and Australian governments. However, after the prohibition on uranium mining the project was placed into 'care and maintenance'. This involved sealing the remaining ore sample with concrete, and enclosure in a cyclone proof, galvanized steel shed. The adit was sealed off and the portal gates were locked. The remaining laboratory, drill core shed and ore stockpile and storage shed have also been fenced and locked.

An EA was issued for Ben Lomond under the EP Act as part of the arrangements for transitioning the regulation of mining in Queensland from the then Department of Mines and Energy (DME) to the then Environmental Protection Agency (EPA). The EA prohibits mining activities on the site through a special condition on the permit.

Although not allowing any mining, the provisions of the EP Act have enabled significant monitoring to be required under the EA. This monitoring is conducted at sites which have been specifically selected to distinguish impacts from the exploratory activities and sample storage on the site as opposed to natural background mineralisation.

EHP will continue to conduct compliance inspections at the site and review the results from the monitoring programs conducted under the EA. Results from the monitoring program and compliance inspections are able to be used to determine:

- if conditions of the EA are being complied with
- whether the historical activities on the site are having any ongoing impact upon water quality
- to what extent monitoring results are indicative of natural levels of mineralisation in the area.

Prior to the recommencement of mining at Ben Lomond, an amendment of the EA will be required. This would pose a major amendment to the EA and trigger a full assessment of the application under the EP Act, including a decision whether an EIS will be required.

All the same, the Queensland Government does have expertise that will be applicable to uranium mining in the fields of human health and safety (Radiation Health and SIMTARS respectively). Further, there are a number of options to enhance skill levels in Queensland Government agencies, and to bring in outside expertise and experience. Options that can be used alone or in conjunction with expertise in Radiation Health and SIMTARS, includes:

- re-prioritise resources to build up government expertise in the environmental management of uranium mines and increase service delivery capacity to remote areas
- develop an MOU with Radiation Health (refer to section 5.6 above) to provide radiation specific expertise during compliance activities
- develop the skills of existing staff through training and engagement with other states, including the possibility of secondments
- use third party auditors to assess compliance of uranium mines
- establish a technical reference committee for the uranium mining industry in Queensland.

Third party auditing

Across Australia, regulatory frameworks involving independent third party certification are widely used to provide assurance that regulated activities are completed or being conducted in accordance with regulatory requirements. For government departments, the use of independent third party certification provides an efficient and effective way of ensuring that technical assessments are adequate, particularly where relevant technical specialist expertise may not be readily available within the organisation. For the community, including those members carrying out regulated activities, the use of third party certification provides a way of ensuring that all regulatory requirements associated with a particular activity are being met.

The *Environmental Protection (Greentape Reduction) and Other Legislation Amendment Act 2012* has introduced amendments to the EP Act to provide a framework for third party certification. This is a form of co-regulation which will assist government and industry to competently undertake activities and deliver outcomes on their behalf (Greentape Explanatory Notes). COAG (2007) recommends that co-regulation is a regulatory approach that should be considered to solve specialist and technical issues where that particular expertise is not readily available, as in uranium mining.

One potential use of the third party certification framework in the context of uranium mining is third party auditing. Under s322 of the EP Act, the administering authority may request an environmental audit by a certified third party auditor if the administering authority is satisfied the audit is necessary and desirable, for example, to assess whether the conditions of an environmental authority have been complied with. Having environmental audits conducted by certified third parties will enable expertise to be sourced potentially from anywhere in the world. To this end, a recent fact finding trip to the Northern Territory demonstrated a high level of technical expertise in the Supervising Scientist Division (SSD) that could be leveraged in third party auditing.

Although there is limited uranium mining expertise in government there is still nevertheless a great deal of related expertise in mining generally, radiation health management, environmental management and transport of hazardous materials. All other Australian state and territory jurisdictions have a system of consultative committees to ensure the proper and efficient management and regulation of the uranium mining industry. To ensure best practice regulation is maintained by limiting jurisdictional overlap, reviewing the results of third party audits and being able to provide in house technical advice, the establishment of a uranium mining technical committee in Queensland could complement the use of third party auditors.

Recommendation 5.6

The Committee recommends the normal financial assurances for mine rehabilitation should be applied to the uranium industry.

Recommendation 5.7

The Committee recommends that third party auditors should be used to augment the in-house expertise of regulators in Queensland.

Recommendation 5.8

The Committee recommends that the Queensland Government, third party auditors and industry should consider using the technical expertise and services of the SSD.

5.9 Conclusion

The uranium mining industry has a number of inherent environmental risks. In general, these risks are consistent with other large scale mining activities, particularly large scale metalliferous mining, and are manageable.

Queensland has a well developed environmental regulatory system that will accommodate the recommencement of uranium mining. The challenge with the commencement of uranium mining is to ensure that the administrative systems and organisational relationships between government departments and the private sector (e.g. third party auditors) are updated to reflect the commencement of uranium mining. The recommendations made above reflect the changes required to maximise environmental protection.

6. Safety and health

The current mining legislation provides a robust statutory framework for the safe and healthy operation of uranium exploration, mining and processing in Queensland. However, the Committee recommends that the Queensland Government should update some of its existing documentation, including preparing both additional mandatory guidelines and advisory guidance to ensure that the best standards are maintained at all stages of uranium oxide production.

6.1 International principles of safety and health to control radiation

Advice from Queensland's Mine Safety and Health Unit within the Department of Natural Resources and Mines (DNRM) is that both Australia and Queensland currently follow the accepted international standards to control radiation hazards. However, given the period since the last uranium operation in Queensland, actions can be undertaken to clarify and strengthen the existing requirements within Queensland.

It should be noted that although this report specifically discusses uranium mining (where uranium oxide is produced as the desired, saleable product), the same control principles to protect health apply where any naturally occurring radioactive material (NORM) is mined, or unintentionally processed. For example, rare earth metals (which are much sought after today for electronic components) and valuable mineral sands, often occur with radionuclides and should utilise controls in line with those here.

In practice, radiation protection worldwide is based on the understanding that small increases over natural levels of exposure are not likely to be harmful, but should always be kept to a minimum. As raised in Chapter 3, the International Commission for Radiological Protection (ICRP) has therefore established recommended standards of protection (both for members of the public and radiation workers) based on three basic principles:

- Justification—no practice involving exposure to radiation should be adopted unless it produces a net benefit to those exposed or to society generally.
- Optimisation—radiation doses and risks should be kept as low as reasonably achievable (ALARA)—economic and social factors being taken into account.
- Limitation—the exposure of individuals should be subject to dose or risk limits above which the radiation risk would be deemed unacceptable.

Underlying these is the application of the 'linear no threshold hypothesis', based on the idea that any level of radiation dose—no matter how low—involves possible risks to human health. This assumption enables risk factors derived from studies of high radiation dose to populations, to be used in determining the risk to an individual from low doses. Ultimately, the weight of scientific evidence does not indicate any cancer risk or immediate effects at doses below about 100 millisievert per year.

Doses are also reduced by a combination of actions including good engineering design, appropriate administrative practices (including education and training) and the use of appropriate personal protective equipment (PPE).

Based on these conservative principles, the ICRP recommends that the additional dose above natural background (excluding medical exposure) should be limited to prescribed levels. These are:

- one millisievert per year for members of the public

- 20 millisieverts per year (averaged over five years with the dose not exceeding 50 millisieverts in any single year) for radiation workers, who are required to work under closely monitored conditions.

Radiation dose records compiled by mining companies have consistently shown that employees are not exposed to radiation doses in excess of the limits. Indeed, the maximum dose generally received is about half of the yearly limit and the average observed is at about one tenth of it. This compares favourably both with natural doses of up to 50 millisieverts per year for some places in India and Europe, without any adverse effects being found. These dose levels are also far below historical exposures such as mean exposures of 750 millisieverts per year in some East German mines between 1946 and 1954, which resulted in increased occurrences of lung cancer in the working population.

The Committee has been advised that DNRM intends to further strengthen local adherence to this prescribed level. This will be achieved by requiring all uranium mining and processing plant companies to submit occupational dose data for all designated personnel to the Australian National Radiation Dose Register (ANRDR). Furthermore, occupational dose data for uranium exploration, mining and processing workers will also be required to be submitted to DNRM initially to confirm that these levels are not breached in the immediate short-term absence of a requirement to be sent to the register.

Note that within this report, processing refers to crushing, grinding, milling, dissolution, floatation, slurring, pumping, filtering, drying, solvent extracting, precipitating and calcining a mined ore or uranium oxide precursor to a final uranium oxide solid product suitable for packaging.

The mining and processing of uranium ore must be regarded as potentially hazardous due to the radioactivity of uranium and its decay products. The radiation hazards associated with the mining of uranium are similar overall to those in many mineral sand mining operations and potentially less problematic than those generated in rare earth processing. However, this is dependent on the mining methodology used.

When the current era of uranium mining began in Australia in the 1970s, a review of the regulatory framework for radiation safety was undertaken. This resulted in the production of the *Australian Code of Practice for Radiation Protection in the Mining and Milling of Radioactive Ores (1975)* (the Health Code). This was formulated from recommendations made by the ICRP and the radiation dose limits adopted by the National Health and Medical Research Council.

In addition to the Health Code, the *Code of Practice for the Management of Radioactive Wastes from the Mining and Milling of Radioactive Ores (1982)* (the Waste Code) was given legal force in the states and territories in much the same way as the Health Code, this is, it was imposed as a condition of licence under state and territory acts.

In 2005, both codes were superseded by the *Code of Practice and Safety Guide for Radiation Protection and Radioactive Waste Management in Mining and Mineral Processing (2005)*, or RPS9 as it is known colloquially. This was developed by the Australian Government, through the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA). This code is consistent with current international recommendations and provides a framework on which the Queensland Government can base guidance material.

Additionally, to assist workers in developing an understanding of radiation risk, it is recommended they receive the *Radiation Workers Handbook*, developed collaboratively by industry and the federal Department of Resources, Energy and Tourism (DRET).

As outlined in Chapter 5, until recently, it had been assumed that if humans are adequately protected from potentially harmful effects of radiation, then wildlife in natural habitats would also be protected. This approach is no longer considered to be consistent with international best practice, and Australia is now developing guidance on radiation protection of wildlife in natural habitats, with ARPANSA expected to issue guidance during 2013.

The Committee believes this issue should be kept under review by the Uranium Mining Oversight Committee (UMOC) to ensure that the protection of wildlife is adequately addressed within the regulatory system for uranium mining in Queensland. This has been included in the Committee's suggested Terms of Reference (TOR) for the UMOC, included as Appendix D.

6.2 Current safety and health legislation in Queensland

The *Mining and Quarrying Safety and Health Act 1999* (the MQSH Act) and the *Mining and Quarrying Safety and Health Regulation 2001* (the Regulation) regulates the operation of mines (other than coal mines) to protect the safety and health of persons at mines and who may be affected by operations.

The objectives of the MQSH Act are to:

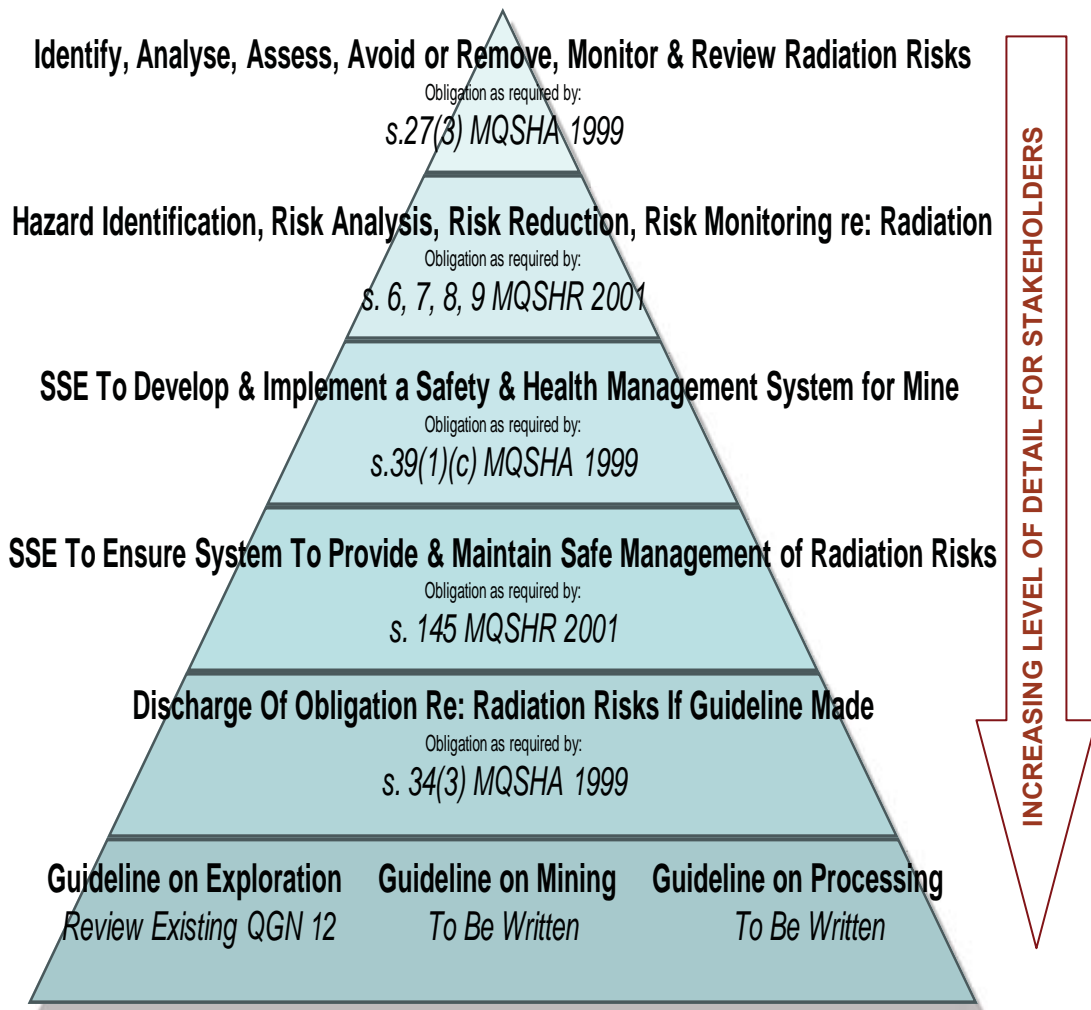
- protect the safety and health of persons at mines and persons who may be affected by operations
- require that the risk of injury or illness to any person resulting from operations is at an acceptable level.

The MQSH Act is Robens-style, risk-based occupational health and safety (OHS) legislation, which is focused on achieving an acceptable level of risk at mining operations. The MQSH Act achieves this by placing obligations on all parties who may affect safety and health at mines. In particular, the site senior executive (SSE) for a mine must develop and implement a safety and health management system (SHMS) for that mine which incorporates risk management processes to ensure the risk to persons from all operations is at an acceptable level.

A key part of this SHMS for any uranium exploration, mining and processing operation will be the mine and quarry radiation management plan (MAQRMP), a situation specific variant of the base radiation management plan (RMP) requirements outlined in ARPANSA's *RPS9*.

Figure 6.0 (below) illustrates the current legal requirements which are deemed suitable and sufficient for the safety and health of all Queenslanders and the current and proposed supporting documentation for these legal requirements.

Figure 6.0 – Current and planned legal requirements for radiation



The MQSH Act and the Regulation are administered by the Mines Inspectorate within DNRM.

In addition to these Acts, Queensland has also developed the *Radiation Safety Act 1999* (RS Act) which is administered by Queensland Health. However, this regulates only the possession and use of sealed radiation sources, such as exploration borehole logging devices, density gauges and XRF spectrometers. The exploration, mining and processing of NORM—the category into which uranium mining falls—is excluded from the RS Act and remains the responsibility of DNRM. However, DNRM recognises that Queensland Health is a department with strong credentials in radiation protection that can provide invaluable support to other departments in this field.

Despite the separation in duties, the Committee has been informed that DNRM and Queensland Health have already had open and advanced discussions on the content of the radiation management plans (for inclusion in the guidelines currently being written by

DNRM) and also on jurisdictional cooperation and demarcation (to be written into the developing Memorandum of Understanding (MOU) between the two departments).

Ultimately, any uranium mining activities, regardless of whether they are on land covered by an exploration permit, mineral development license or mining lease issued under the *Mineral Resources Act 1989* (the MR Act) are governed by the MQSH Act and the Regulation.

Specifically with regard to risks from radiation, section 145 of the Regulation requires that where radiation is a hazard, the SSE must, as part of the SHMS, have a system for the safe management of the radiation. This means establishing a MAQRMP that effectively prevents exposure to radiation, and where this is not possible, controls the radiation exposure to acceptable levels.

The MAQRMP is paramount to that section of the SHMS that manages the risk from radiation during exploration, mining and processing activities. The requirements for the MAQRMP relating to these three activities may be slightly different, but will stem from one base template document and principles. For example, the executed processes dealing with exploration drilling waste (such as burying it in a dedicated pit) may differ from those used for processing (such as pumping into a tailings storage facility) but, the underlying principles will be identical - in this case ensuring safety through isolation of the risk away from humans.

The Regulation also provides for:

- assessing the health of workers
- setting workers' exposure limits
- adjusting workers' exposure limits
- limiting workers' exposure
- monitoring workers' exposure.

The ionising radiation exposure limit for a worker is specified in the Regulation and conforms with the requirement of ARPANSA's *Recommendations for Limiting Exposure to Ionizing Radiation (1995) (Guidance Note [NOHSC:3022(1995)])* and *National Standard for Limiting Occupational Exposure to Ionizing Radiation to Ionizing Radiation [NOHSC: 1013(1995)]*.

Recommendation 6.1

The Committee recommends that the Queensland Government should continue to oversee health and safety on uranium mine sites through the existing mining legislation, as it provides a workable framework for the safe and healthy operation of uranium mining.

As mentioned earlier, the ICRP has set some control principles in relation to all sources of ionising radiation, regardless of size and origin. However, it is recognised that all sources and exposures cannot be treated in the same way and with the same level of resources. The following applies the general system of radiation protection to exploration, mining and processing operations and incorporates the OHS hierarchy of control used in the MQSH Act and the Regulation:

When controlling risks, the mine operator must firstly look to eliminate the risk. If this is not reasonably practicable, the operator must minimise the risk so far as is reasonably practicable.

The specific control measures for radiological protection are set out below and are listed in a hierarchy (i.e. most effective to least effective):

- Eliminate the risks—any decision that alters the radiation exposure situation should do more good than harm. This applies to all exposure situations.
- Minimise through engineering controls—for example, optimisation of protection. The likelihood of incurring exposures, the number of people exposed, and the magnitude of their individual doses should all be minimised so far as is reasonably practicable, taking into account economic and societal factors. This applies to all exposure situations and is embedded within the concept of workplace risk assessment or analysis.
- Minimise through administrative controls—for example, dose limitation. The total dose to any individual from regulated sources in planned exposure situations (other than medical exposure of patients) should not exceed the appropriate limits recommended by the ICRP.

One of the most effective ways to control radiation risks is to ‘engineer out’ radiation hazards to the greatest extent feasible.

The appropriate upper bound for optimising protection with regard to a particular activity or plan will vary according to a number of factors including the overall benefit to society from that activity, the cost and practicability of protection options, and the benefit received by those incurring the exposure.

The principle of optimisation of radiation protection is a cornerstone of the international system for radiation protection and is the key driver for ensuring that radiation doses are not just maintained below standards, but are kept to the lowest feasible level throughout the lifecycle of a practice involving radioactive materials. This principle is commonly referred to as the ALARA principle. This principle applies to the potential for accidental exposures as well as predictable normal exposures.

The use of risk management to develop a suitably detailed plan for the identification, control and monitoring of radiation exposure and the management of radioactive wastes is necessary to coordinate the system of radiation protection. This will be documented in new and revised guidelines for radiation management plans for NORM for exploration, mining and processing operations.

Administrative controls should only be used to control residual risk when all other control measures have been utilised.

An existing guidance note, *QGN12—Radiation Protection from naturally occurring radioactive materials (NORM) during exploration* published by the Mines Inspectorate, is currently available on the DNRM website. This guidance note is to be updated and elevated to a guideline in the near future to bring it into line with:

- ARPANSA Code of Practices (to formally link the RMP in RPS9 to the MAQRMP in the SHMS under MAQHSA)
- the recent changes in mining policy (regarding the expected content in a MAQRMP for mining and processing)
- some technological advancements in the industry for example, dust control at drilling sites.

Initially, two new guidelines on mining and processing will also be written to detail the acceptable health and safety standards to be achieved in the mining and processing of NORM and to clarify how ARPANSA's broad RMP requirements in RPS9 will be interpreted in Queensland by DNRM. This is not without precedent in Queensland, as Queensland Health have already published a template form for sealed source radiation users interpreting the general requirements of RPS9 in the form of a 'radiation safety protection plan' (RSPP). Both departments are already in close consultation standardising their approaches and base principles to both sealed and unsealed (i.e. NORM) radiation sources.

All three NORM guideline documents will have a common format, link the new regime to the ICRP, ARPANSA and MQSHA foundations, and clearly indicate what is mandatory (for example, what the expected content and scope of a MAQRMP will be) and what is advisory. It will highlight proportionality as key to the resultant documents for the SHMS. The level of detail in the MAQRMP documents will depend on the degree of potential radiation exposure, which has been measured or estimated through rigorous assessment of risk using all available information and existing technology to control it.

For example, the MAQRMP for NORM for an initial greenfield exploration project would not be expected to contain as much detail as one for an advanced mining and processing project already dealing with radionuclides. As such, a MAQRMP for NORM may need to be developed for new exploration activities and a separate one for established mining operations (including associated processing).

Also, all three documents will need to define what is – and what is not – radioactive (and, therefore, what will trigger a MAQRMP, the presence of any statutory positions, health surveillance, the training needed to perform certain roles and responsibilities (such as a radiation safety officer) and expected standards for controls for known radiation risks).

Recommendation 6.2

The Committee recommends that the Queensland Government should update its safety guidelines for industry by drafting three documents based on Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) guidelines (containing mandatory and advisory actions) on the following:

- **exploration (based on the current guidance note QGN12)**
- **uranium mining**
- **uranium milling operations.**

6.3 Uranium ore exploration, mining and processing hazards

Historical experience of worldwide uranium exploration, mining and processing operations identifies areas of risk that require particular attention in practice. These include:

- inhalation or ingestion of dust containing radioactivity during drilling rig exploration activities
- inhalation of radioactive radon gas and radon decay products in underground mines (and, to a lesser degree, open pits) and in processing areas with restricted ventilation

- external irradiation by gamma radiation from the surrounding ore rock in underground tunnels (and, to a lesser degree, open pits) and in processing areas close to radioactive material
- inhalation or ingestion of ore dust containing radioactivity owing to poor dust control in underground tunnels or roadways or in open pit workings or roadways
- inhalation or ingestion of ore dust owing to poor ore storage and mechanical handling prior to (wet) primary crusher treatment
- inhalation, absorption, ingestion or invasion of leachate solutions containing uranium and other decay products of uranium and thorium during hydrometallurgical processing with poor mechanical enclosure mechanisms (e.g. dripping or splashing onto walkways or forming an aerosol at a discharge point)
- inhalation, absorption, ingestion or invasion of (increased) radioactive materials in the production, packing and handling of the final uranium oxide concentrate.

Depending on the required chemical process and its efficiency to separate uranium from the ore, there may possibly be the build-up of radionuclides within certain systems not expected to handle or contain radioactive materials, (e.g. radium as scale in water systems or polonium vaporising during tapping of copper in a flash furnace). The activity of these products can be several orders of magnitude higher than the feed ore.

The Committee has been advised by DNRM's Mines Inspectorate that it will undertake a program to manage radiation issues. It is anticipated that a dedicated team of inspectors will initially perform coordinated and scheduled desktop audits of paperwork, backed up by full compliance audits of systems and plant and processes, whilst ongoing inspections of facilities and analysis of radiation monitoring results are routinely executed.

These will largely rely upon the mandatory content of the proposed guidelines, so the preparation of these – with the input of the wider Inspectorate – will be crucial in establishing a system that ensures high standards and the ability of the Inspectorate to enforce where and when necessary.

The Committee considers that there should be routine inspection across the following matters over the initial years of uranium development:

- the developing exploration sites and civil construction sites
- the design and commissioning of plant
- the development of mining operations at selected brown and greenfield sites
- the pilot plant testing of equipment.

The Committee understands that these inspections will be co-ordinated by an in-house, experienced DNRM Senior Inspector of Mines (Chemical / Metallurgical / Radiological), with extensive Australian and international experience, who is a qualified Occupational Hygienist and who spent four years in the South Australian Mine Inspectorate gaining practical knowledge of conventional underground and ISL mining of uranium and the processing of copper, gold and silver from uranium -rich ores.

Key higher risk activities and controls for future operations have already been identified, including:

- exploration drilling rig dust (suppression systems)
- short-lived radon daughter inhalation into lungs underground (mine ventilation)
- ore stockpile and road housekeeping dust (suppression systems)
- solvent extraction fire and explosion risks (fire prevention and mitigation systems)
- smelting fume having vaporised radionuclide risk (extraction ventilation and nuclide bleed systems)

- corrosion of pipe work leading to leakage of radio nuclides to the environment or ejection over persons (preventative maintenance)
- transport of uranium oxide precursor from one mine to another for processing or final product by road (fatigue management, vehicle design, emergency procedures)
- plant maintenance (rigorous risk-based procedures, training, supervision).

DNRM is intending to develop in house training on such issues, which may develop into external training to be delivered by DNRM's registered training organisation, the Safety in Mines and Testing Research Station (SIMTARS) to the industrial sector. Third party accreditation for inspectors is, however, desirable in the short-term to prove competency.

Of the available courses, the most credible and best value for money for DNRM inspectors is the 'Radiation Safety in the Exploration for, and the Mining and Processing of Uranium, Mineral Sands and Rare Earths Ores' course. This is supported by the Core, Sealed Source and Unsealed Source Examination to become a radiation safety officer with the South Australian Environment Protection Authority (SA EPA). Numerous DNRM inspectors have successfully completed this course already.

Recommendation 6.3

The Committee recommends that selected mines inspectors should undertake training as radiation safety officers for natural occurring radioactive material (NORM), so they can conduct proportionate and consistent assessments of radiation management plans and provide technical advice regarding radiation safety in mining.

DNRM and Queensland Health have already started to develop an MOU to aid and support one another on practical in field radiation issues. This goes beyond the formal jurisdictional cooperation and demarcation of duties. In short, both are pooling their different, but complementary expertise in radiation and mining to mutually address any foreseeable radiation issues of the future. For example, to ensure that any arising on or off mine site radiation issue can have the input of both DNRM and Queensland Health, whether it be a sealed source audit on a mine site or a public road based transport incident involving uranium oxide spillage.

Eventually, a dedicated regime of detailed audits and hazard analysis of MAQRMP's will be coordinated in house by DNRM and may include input from a wider inter-regulatory working group (including health and medical physicists from Queensland Health and their testing laboratory, and specialists from the Department of Transport and Main Roads (TMR), the emergency services and SIMTARS) in due course.

Recommendation 6.4

The Committee recommends that Queensland Health and DNRM should continue to develop their collaborative approach by way of a formal MOU. Consideration should be given to forming a regulator working group operating under an MOU.

The following section looks at the health and safety considerations specific to various aspects of uranium mining, transport and processing.

1. Exploration

The SSE controlling an exploration operation must ensure that adequate measures are taken to control the exposure of workers and other persons (including members of the public) to radiation at or from the exploration operation that handles NORM, including uranium.

The main radiation exposure pathways for exploration require some form of control. These pathways include:

- direct gamma irradiation from radiation-emitting materials (for example, core samples, sludge and drill cuttings). This is significant where long periods of time are spent close to large deposits of high grade ore
- inhalation of airborne radionuclides (airborne dust containing uranium or NORM) inhalation of radon decay products
- ingestion of radionuclides such as dust on hands, which can be transferred to the mouth while eating or smoking.

To actively control exposure to radioactivity during exploration requires:

- thorough preparation and planning
- dust minimisation and dust suppression through the application of water and, when necessary, use of respiratory protection
- good housekeeping and personal hygiene practices
- effective monitoring and recording systems.

Dust is typically the greatest source of exposure and demands dust suppression at source. Potential dust sources on a drilling rig when drilling dry or above the water table include the T-piece, splitter, cyclone (top vent), drill rods, and collar cutting.

Water should be applied to prevent any form of contamination being made airborne. The difference between drilling with and without injected water acting as a dust suppressant is appreciable, as the water captures the dust that would become airborne. Control of the dust at the source is always preferable to relying on PPE such as masks, which are prone to failure and improper wear. Any clothing, plant or PPE should be cleaned and assessed for surface contamination prior to leaving site to ensure radioactive material is not being transported from the site. The resultant washings should report to a sump and be buried by at least one metre of clean fill.

Ingestion of radioactive material can be prevented by maintaining proper levels of workplace and personal hygiene and by washing hands before meal breaks or smoking. Gamma radiation does not generally require any active control measures as it can be monitored with a survey meter although an appropriately calibrated portable gamma survey meter should be used to identify any active samples.

A personal dosimeter such as a TLD badge should be supplied for those workers with routine exposure to potentially radioactive ores. Dose results should be regularly provided to the wearer and a record should be kept of all worker doses. Such TLD badges should be stored suitably between uses and not be exposed to any unrepresentative radioactive source when not in use. A hook is usually allocated to each worker and each control badge. Alternatively, an electronic personal dosimeter may be used.

With a well designed RMP and acceptable work practices doses, radiation exposures in mineral exploration are not expected to be significant, and should be well below the public limits.

2. Underground mining

Underground mining of uranium or NORM has all the risks of underground metalliferous mining: workplace transport, guarding, noise, manual handling, falls from height and ground control to name a few. However, as discussed in an earlier section, it does present additional risks, including:

- inhalation of radioactive radon gas and radon decay products
- inhalation or ingestion of underground tunnel or roadway dust containing radioactivity
- absorption of gamma radiation from the surrounding ore rock.

The former two are primarily controlled by a very high volume of fresh air being provided to the active work areas, whilst roadway dust is also controlled using water carts and enclosed air filtered booths on any vehicle. This is all verified by supporting monitoring of the air quality in work areas. Controls include exclusion of humans from high dose areas, spray-creting to reduce gamma doses, and close monitoring of these high risk work groups.

3. Open pit mining

Generally, an open pit has similar 'conventional' metalliferous and additional radon decay product, dust inhalation and ingestion and gamma radiation risks that occur in underground mining, but at a much lower level. Natural ventilation tends to remove airborne contaminants.

4. In-situ recovery (ISR) mining

At ISR operations, pipe corrosion, high pressure leaks and spills and solvent fires remain the primary foreseeable source of high potential incidents and serious accidents, with the radiation implications associated with undertaking maintenance to remedy causing added complications. In particular, surface pipe work leaks of pregnant liquor can be quite large, if not identified quickly.

5. Processing

Specific processing plant risks beyond conventional ones (such as entrapment, shearing in unguarded equipment, falls from height, manual handling, chemical sensitisation, burns) include:

- inhalation or ingestion of dust containing radioactivity owing to poor ore storage and mechanical handling prior to (wet) primary crusher treatment (controlled using good housekeeping, water suppression and enclosed air filtered booths on any vehicle or work cabin, all verified by supporting monitoring of the air quality in work areas)
- inhalation, absorption, ingestion or invasion of leachate solutions containing uranium and other decay products of uranium and thorium during hydrometallurgical processing with poor mechanical enclosure mechanisms (controlled using good design and maintenance procedures)
- depending on the required chemical process and its efficiency to separate uranium from the ore, the possible build up of radionuclides within certain treatment systems not expected to handle or contain radioactive materials (identified by regular and

ongoing personal and area monitoring and controlled using suitable engineering means)

- inhalation, absorption, ingestion or invasion due to the production, packaging and handling of the final uranium oxide concentrate.

As with ISL operations, pipe corrosion, high pressure leaks and spills and solvent fires remain the primary foreseeable source of high potential incidents and serious accidents, with the radiation implications of maintenance to remedy causing added complications.

However, there is the additional risk of radiation exposure to maintenance personnel where scaling of water systems (containing radium) or metal smelting (containing vaporisable radionuclides, such as Po-210 in copper) occurs.

Generally speaking, for mining and processing operations, it is important that the best practicable technology is incorporated into the design of facilities early on. The Inspectorate will focus on this by engaging with the industry from the outset. For example, the location of radioactive mineral stockpiles, tailing storage facilities and exhaust stacks in relation to regularly occupied workplaces and the public have a significant effect on the radiation exposure of these groups and on the most effective manner in which operational procedures are carried out.

6. Transport

The radiation worker handbook *Radiation Control in the Mining and Mineral Processing Industry* states that transport of radioactive materials has to comply with the relevant state and territorial regulations, which in turn follow the ARPANSA Code of Practice for Safe Transport of Radioactive Material, drawn directly from the IAEA International Regulations.

ARPANSA's Code sets out a number of controls that must be followed, including package design, transport signage covering package labels, vehicle or container placards, shipper's certificate, driver briefing, and emergency response plan. This also lists the actions to be taken following a traffic accident that causes spillage of the material.

Generally, radioactive materials are packaged with at least two levels of containment, for example, sample bags in box, yellowcake drums in sea freight container. The packaging, labelling, documentation and planning depend on the radioactivity of the material and on the surface gamma dose rate of the package that is being transported. If these rules are followed, doses to workers who are transporting radioactive material will be well controlled.

If the grade is lower than 800 parts per million, uranium-bearing exploration samples can usually be classified as 'excepted packages' if not absolutely exempted from the Code of Practice for Safe Transport of Radioactive Material. Uranium oxide will generally be classified as 'low specific activity' material.

6.4 Monitoring

The main aims of monitoring radiation levels in the workplace and in the environment are to:

- determine compliance with regulatory limits
- determine radiation exposure of workers and members of general public

- assess the impact of operations on the local environment
- provide information on the effectiveness of control measures
- assess whether doses are as low as reasonably achievable (for example, checking the effectiveness of control measures, studying specific tasks, identifying poor work practices, investigating incidents).

The Committee believes that a detailed description of the radiation monitoring program should be provided in the MAQRMP for all exploration, mining and processing operations and be based on an assessment of risk.

In general, more frequent monitoring is required where levels are either higher or variable. Less frequent monitoring is required where levels are low and relatively constant. The MAQRMP should also identify the responsible radiation safety officer (RSO) for the operation and the competency level needed.

For each radiation related parameter (external radiation, airborne radioactivity, waterborne radioactivity, radon decay products, and surface contamination) the program should list following:

- location, task or category or workers monitored
- environmental media monitored (e.g. air, water)
- type of sampling (personal, positional, ground water, surface water)
- duration of sampling
- frequency of measurement
- sampling equipment and calibration records
- analysis method, the type of radiation or radionuclides measured
- any other information, as applicable.

For all new operations, the Committee deems that the initial monitoring program should be exhaustive in order to thoroughly characterise the radiological environment and identify any locations or work practices requiring special attention. When the radiation levels stabilise and it is firmly established that a facility operates under normal conditions, monitoring frequencies and locations should be adjusted to reflect the level and variability of different radiation parameters. Again, more frequent monitoring is required where levels are higher and variable, and less frequent monitoring where levels are relatively low and constant.

The need for monitoring of gaseous radioactive radon concentrations is dependent on particular site conditions, but should be mandatory in enclosed workplaces, for example underground tunnels or permanent core storage facilities. Areas with the potential for restricted ventilation and the presence of large quantities of ore (for example, open pits and pregnant liquor ponds at ISR operations) should also be evaluated for radon decay product exposure.

There must be details of the quality assurance program for the radiation monitoring program, including the various actions which are taken to assess the adequacy of equipment, instruments and procedures against established requirements, for example:

- quality and specifications of equipment and instruments
- training and experience of personnel using equipment and instruments
- verification of measurement procedures by the analysis of control samples and the use of standard methods for analysis (where applicable)
- frequency of calibration and maintenance of equipment and instruments
- details and frequency of independent audits

- the need for traceability of the results of monitoring programs to a national standard
- the degree of documentation needed to demonstrate that the required standard of quality has been achieved and is maintained.

The samples, such as filters from dust monitoring, need to be kept for two years for the purpose of comparative analyses.

Records management and reporting procedures must list the type of records to be kept, their format and method of storage. Records of monitoring results, dose assessments (including calculation methods), and related information must be retained in an easily retrievable form and kept for a period of at least 30 years, although this time limit may be reviewed.

The records required will depend on the magnitude of potential radiation exposure on a particular site. The risk assessment would record definitive reasons for any lack of record retention. However, the RMP would normally require the following records to be kept:

- information on radiological conditions at the particular site (external gamma radiation surveys; airborne and waterborne radioactivity surveys, surface contamination surveys, inventory of radioactive materials, methods and locations for the disposal of radioactive wastes)
- assessments of radiation exposure of workers and members of the public (external and internal radiation doses and methods for their determination and bio-assay data where applicable)
- assessments of impact on the local environment (measurements of all potential pathways of radioactive material discharges, environmental exposures, modelling and assumptions used in assessments)
- all documentation relevant to the implementation of the system of radiation protection on the site (safety assessments of whole operations and designs of relevant equipment; descriptions of unusual operational events, standard operating procedures and relevant company policies, descriptions of training programs, quality assurance data and reports of all external audits conducted on the site).

Policies should contain a requirement that the individual annual occupational exposure record includes the following:

- unique identification of the individual
- the exposure for the current year and, where available, for the relevant five year period prior
- results of the measurements for the estimation of the external dose, and methods of assessment
- results of the measurements for the estimation of internal dose (result of personal dust and radon decay product monitoring), and methods of assessment
- the allocated dose for lost or damaged monitors or samples
- any special radiation exposure assigned to the worker
- record of the formal declaration of pregnancy, any revocations of such declaration, and measures taken to ensure that dose to this worker is kept under 1 millisievert over the remainder of the pregnancy.

Dose assessment records should specify how the results of the monitoring program would be used in the assessment of doses of workers. It would include an estimate of the likely doses to be received by the various categories of workers, together with documentation of all assumptions used. DNRM will formulate an internal monitoring program to ensure radiation risks from all sites are kept within acceptable levels

whatever the national developments on dose recording, especially given that exposure monitoring results from the four currently operating mines are sent to ARPANSA at present.

ANRDR was established in 2010 to collect, store, manage and disseminate records of radiation doses received by workers in the course of their employment in one centralised database. ANRDR currently only allows workers in the Australian uranium mining and processing industry (i.e. at Olympic Dam, Beverley, Honeymoon and Ranger mines) to keep track of their radiation doses.

It is maintained and managed by ARPANSA and, according to its website, “expansion of the ANRDR to include workers exposed to radiation in other industries would be a desirable outcome”. There are current discussions across Australia about extending this scheme to current mineral sand operations in the near future.

Queensland should support all efforts to expand the ANRDR scheme to cover all workers (including regulatory inspectors) in an occupational role in and around the uranium, NORM, mineral sand and rare earth mining industries.

Recommendation 6.5

The Committee recommends that the Queensland Government should fully support the use of the Australian National Radiation Dose Register (ANRDR), including:

- **submission of occupational radiation exposure data from all Queensland uranium mining operations to the ANRDR**
- **efforts to expand the ANRDR scheme to cover all workers in Australian mining operations involving occupational exposure to naturally occurring radioactive substances, however categorised (i.e. uranium, NORM, mineral sands or rare earth mining).**

The Queensland Government should also devise an internal state monitoring regime to ensure that radiation risks from naturally occurring radioactive materials are kept within acceptable levels in Queensland.

7. Economic and community development

Summary and introduction

The Queensland Government has a comprehensive approach to delivering positive regional outcomes from resource projects. The first element of this approach is the mandatory use of detailed social impact assessments (SIAs) and management plans as part of the Coordinator-General's 'coordinated projects' approval process. This assessment includes consideration of cumulative impacts from multiple projects within a region.

The Department of State Development, Infrastructure and Planning (DSDIP) supports this approach by addressing economic development and infrastructure planning and delivery in a coordinated manner. DSDIP has programs and projects in place to support regional economic and community development. These include a strong regional services program delivery arm, local industry policy, the Northern Queensland Resources Supply Chain Project, support for Regional Development Australia committees and the Royalties for the Regions (R4R) program.

To date, the existing framework has largely been focused on addressing the regional and community impacts and benefits of bulk commodities (coal) and extensive resource activities (coal basins, coal seam gas extraction and metals mining around Mt Isa).

The impacts from high value, low volume resources such as uranium will require some different considerations, including how to manage land use conflict. Following the Committee's investigations, it considers that uranium mining does not present any characteristics that justify changes to these existing frameworks. Therefore, the Committee recommends that uranium mining be subject to the same regulatory framework as other mining activities, including compensation resulting from resource activities.

The approach to community engagement and regional economic development (including Indigenous community issues) will be in the spotlight during the assessment and approvals period for the re-establishment of uranium mining in Queensland. To facilitate community and economic development, the Committee recommends that the R4R program should be extended to future uranium mining areas.

Key findings

- Uranium mining, milling and transport are likely to have relatively low infrastructure development requirements compared to bulk commodity projects.
- Possible infrastructure development is needed, including all-weather sealed roads, energy supply and water supply (dependent on resource location and remoteness).
- There will be moderate housing and service impacts, with potential cumulative impacts arising from the development of mines in areas that may already be experiencing housing stress.
- Land use conflicts can be adequately managed through existing regulatory frameworks including the mapping of strategic cropping land and compensation mechanisms under the land access frameworks.

- The R4R program may need to be extended to facilitate community and economic development. The need exists to examine the potential regional community impacts and the proposed state revenues from uranium mining.
- Queensland's existing system of social impact assessment (including proposed changes) and the recent addition of the R4R program appear more comprehensive than comparable Australian jurisdictions or international examples.

The Queensland Government is committed to facilitating the economic development and improved liveability of all Queensland regions through the strengthening of the four economic pillars – mining, agriculture, tourism and the construction industry.

DSDIP has the lead role in identifying and fostering regional economic development. It has aligned its resources to match key priorities of the Queensland Government with the intent to promote synergies and efficiencies. Key initiatives include:

- the R4R program
- infrastructure prioritisation and frameworks for growth regions including the Galilee Basin, Surat Basin and the North West Minerals Province
- establishing the Gasfields Commission
- facilitating growth of the resources sector, and a renewed focus on investment attraction and supply chain development to build a four-pillar economy.

7.1 Uranium industry development

The consideration to invest in uranium mining in Queensland is a complex one, which juggles a diverse range of economic, metallurgic, infrastructure, logistics, environment, regulatory and geology issues. However, these issues are not specific to uranium mining.

Tenure— a property right to recover uranium and an ore body target— is fundamental to investment. The pre-feasibility, feasibility and detailed engineering work attempts to assess at what cost (and risk) it might be possible to recover uranium and to map the assumptions that underpin those costings.

Regulation plays an important role in investment decisions. As such, companies will look for a clear regulatory process and a stable regulatory environment to provide operational certainty and guide the decision making process.

Like all other mining projects, a uranium mining company must receive a return on investment (ROI) that satisfies the company's investment criteria. Particularly in mining where many companies operate globally, the project must exceed other opportunities in other jurisdictions around the world.

The ROI for uranium projects will be heavily influenced by the following factors:

- long-term global price projections
- size and quality of deposits (which impacts the costs of extraction)
- sale price of the commodity over the life of the mine
- cost of developing and operating the mine over the life of the mine
- availability and security of key inputs such as labour, water and electricity
- fiscal environment (for example royalties and taxes to be paid) and fiscal stability

- level of community support for the project
- nature (and comparative burden) of the regulatory environment and, in particular, the risk of delays from regulatory failure.

7.2 Encouraging investment in a uranium mining industry

As all of Australia's uranium is exported for electricity generation there is little the Queensland Government can do to encourage market demand for uranium. However, one strategy to promote initial investment and expedite the commencement of mining is to release the Mary Kathleen site through a tender process.

Mary Kathleen tender release

During stakeholder consultations the Committee was asked how long it would take for the first uranium mine to be established in Queensland. The commencement of the approvals process for a uranium mine will be determined by individual project proponents. Once the approvals process has commenced, there are a number of variables which may affect when a mine commences operations.

These variables include the proposed mine's location and its surrounding environment and geology, and the likely duration of the construction phase of the mine. These processes could take several years. In addition, all uranium mines must be approved by the Australian Government. The Queensland Government has limited control over the time this takes.

One specific deposit that may generate interest and facilitate uranium activity is the Mary Kathleen deposit. The Committee notes the commitment by the Honourable Andrew Cripps MP, Minister for Natural Resources and Mines, to investigate the redevelopment of Mary Kathleen for rare earths subject to assessment of site safety and environmental issues.

This investigation provides an opportunity to also examine further uranium mining activities as part of the release. If pursued, environmental matters relevant to uranium should be considered as part of the tenure release process.

While the resources at Mary Kathleen had been exhausted commercially, based on the previous uranium only operation, it is likely that it will be more viable when mined with other minerals such as rare earths. Potential uranium activities at the site will allow the Queensland Government to conduct assessment through the proposed 'coordinated projects' process (discussed in Chapter 4).

This includes the opportunity for rehabilitation of the former mine site at Mary Kathleen, to be made a condition of the tender process. Detailed rehabilitation requirements will then be determined as part of the environmental impact assessment (EIA) process.

Recommendation 7.1

The Committee recommends that the Queensland Government should continue investigations into the redevelopment of Mary Kathleen. In addition to the commitment to pursue rare earths, these investigations should consider the opportunities for producing uranium as a byproduct of rare earths production, and the possibility of including rehabilitation requirements as part of any tender process to release tenure.

While the Queensland Government has a limited role in increasing market demand, strategies can be employed to encourage investment and development when market factors are positive including:

- establishing a regulatory environment that ensures Queensland's uranium exports are competitive. Key elements of this are an appropriate royalty rate (Chapter 9), a reduced regulatory burden with a best practice regulatory model that is risk-based and outcome-focused and financial incentives including concessions and subsidies for mineral exploration activities.
- the promotion of the broader exploration industry to sustain future investment.

The Geological Survey of Queensland (GSQ) will play a critical role through its promotion of geoscientific data and exploration potential. GSQ provides well recognised public benefits for the exploration sector. High quality geosciences data helps to attract exploration investment in Queensland by identifying the areas with favourable resources potential. The provision of this data generates significant economic activity and will be critical in helping to develop Queensland's uranium industry. QRC has raised concerns with the Queensland Government recently regarding GSQ's budget allocation being at a six year low.

7.3 Regional industry development, facilitation and investment

Queensland's regions are interconnected economic zones that represent a number of diverse sectors, enterprises and service centres. Together they form the economic fabric of Queensland's regions. The Committee notes that supporting local economic development and supply chains is a key part of Queensland's approach to building stronger regions.

The role of DSDIP includes developing and supporting regional and cross-regional linkages to improve the economic environment and the competitiveness of businesses in Queensland. The department plays a significant project facilitation role in support of industry development and investment – removing impediments to investment and development through advocacy and regional coordination.

The metals and industrial minerals resource sector largely based in north Queensland in the North West Minerals Province (centred on Mt Isa) and the emerging North East Minerals Province (west of Cairns) contains a significant portion of the world's known lead and zinc resources, as well as large resources of silver, copper, gold, uranium, nickel and other minerals. Further growth in minerals industries will depend on investment in stronger economic infrastructure such as rail, road, energy and port projects.

The Northern Queensland Resources Supply Chain (NQRSC) is a region running west to east from the North West Minerals Province surrounding Mt Isa to the Port of Townsville and Abbot Point. To the south, the NQRSC overlaps the northern part of the Galilee Basin and to the north it includes the Gulf region, the Port of Karumba and the North East Minerals Province. The NQRSC encompasses mineral and agricultural production areas, transport, power, water and ports infrastructure and industrial and processing areas.

DSDIP is currently undertaking work to identify and address improvements to west-east freight movement along the supply chain including products outward and materials and equipment inwards. Matters being addressed include a long-term demand forecast model, supply chain coordination and infrastructure resilience. The need for a stable regional energy supply is also under consideration.

The particular characteristics of uranium mining – small volume high value outputs, secure on site processing, regulated specialist handling requirements and existing authorised export ports (Darwin and Adelaide) – mean that uranium mining is similar in some ways to gold mining.

The impact of the uranium mining and processing operations on local economies and infrastructure will vary significantly depending on the remoteness of the operations. For example, some likely sites may require all-weather roads to permit the transport of processed ore to the export location. A number of submissions to the Committee identified concerns about the reliability and suitability of existing infrastructure networks to service uranium mines, including the perceived need that “wet season road access will be required for safety and operational reasons” to potential mine sites in the Gulf region.

It is clear that uranium mining impacts will differ from the impacts of bulk commodity operations (e.g. coal mining) and dispersed resource extraction (e.g. coal seam gas). The research and planning work now underway in the NQRSC will aid in creating competitive and sustainable conditions for new developments to occur. This planning work will also help to identify desired outcomes from new developments. The level and nature of access to mines will be determined based on the outcomes of EIAs and the nature of the mining activity.

7.4 Regional and community development

The R4R program is a Queensland Government initiative to invest in regional community infrastructure, roads and floodplain security projects. This initiative helps to ensure that regions hosting major resource developments receive genuine long-term royalty benefits through better planning and targeted infrastructure investment. The program will help resource communities better manage the consequences of resource sector development, seize economic opportunities and encourage growth.

The R4R program aims to build community capacity and economic sustainability through:

- improved community, road and flood mitigation infrastructure, which improves the liveability and amenity of communities
- development that is consistent with Queensland regional economic or planning priorities

- economic development and diversification in communities and increased private sector investment
- additional infrastructure funding for resource communities from other state, local and Australian Government sources, and the private sector, including Public Private Partnerships.

Applications can be made by local governments in communities that are experiencing growth pressures arising from large-scale resource developments or from their role as service centres and hosts of major infrastructure projects linked to resource developments.

Local governments with known uranium deposits that were eligible in the pilot round (2012-2013) for funding from the Resource Community Building Fund only include Cloncurry Shire Council and Mt Isa City Council. Townsville City Council, which was also eligible for funding in the pilot round, is adjacent to an area with known uranium deposits.

Other Queensland councils with known uranium deposits that are outside the scope of funding eligibility (based on the *Australian Mines Atlas*) include Burke Shire Council, Etheridge Shire Council and Charters Towers Regional Council. Threshold conditions should be identified for inclusion of these councils and others impacted by new mining operations in the R4R program.

Eligible local governments are encouraged to partner with other organisations in developing and implementing infrastructure projects. Local government must be the lead partner of any consortium. Potential project partners include resource sector proponents, economic development organisations, Regional Development Australia Committees and Queensland Government agencies where applications include bringing forward planned infrastructure spending.

The Committee notes that DSDIP is actively engaged with these organisations and acts as a champion for regional infrastructure needs including prioritisation and regional coordination to activate economic development in the region.

DSDIP also collaborates on the development of detailed regional economic plans and ensures their integration with local and regional planning activities to assist with future regional funding, infrastructure and investment priorities and, importantly, to provide guidance and intelligence on DSDIP priorities in the region. Additionally, mechanisms exist and have been used in other resource communities to assist local governments in planning and developing new areas for residential development, including accessing suitable land.

Recommendation 7.2

The Committee recommends that the Queensland Government should investigate extending the Royalties for Regions (R4R) program to those areas where uranium mines may be developed.

7.5 Managing land use conflicts

While it is well understood that there are economic benefits from mining, the Committee appreciates that this land use can cause conflict with agricultural uses and present significant concerns for farmers. The Committee notes that there are currently statutory mechanisms in place to protect landowners' rights and establish compensation frameworks and to manage these conflicting uses in an equitable manner.

Restricted lands

The protection of land includes the development of 'restricted land' provisions that apply across the state (including urban and rural uses), which prevents any resource activity from occurring within a certain boundary.

There are two types of restricted lands:

- Restricted land (category A), is land within 100 metres laterally of a permanent building used: (a) mainly as accommodation or for business purposes; or (b) for community, sporting or recreational purposes or as a place of worship.
- Restricted land (category B), is land within 50 metres laterally of any of the following: a principal stockyard, a bore or artesian well, a dam or another artificial water storage connected to a water supply or a cemetery or burial place.

The current law prevents any resource activity from occurring within the restricted lands unless a resource company has the landholder's written consent. Written consent can be secured in return for compensation and authorised conduct under the land access laws and/or the compensation agreement (mining leases) depending on the type of the tenure.

Strategic cropping land

Queensland also has an established framework for the protection of 'strategic cropping land' (SCL). Through the *Strategic Cropping Land Act 2011* (SCL Act), land that is identified as SCL is protected from development that will have an adverse impact on the production capacity of the land. This Act applies to all resource proponents seeking to carry out activities on SCL or proposed SCL, and would adequately capture any future uranium development.

Compensation

The current legislative framework provides two levels of compensation to landholders and business owners impacted by resource activity. The following table list the two compensation types.

Compensation	Description of compensation	Condition of which tenures	Legislation
Land access conduct and compensation agreement (CCA)	Resource companies must notify the landholder prior to accessing private land and negotiate a CCA prior to undertaking activities that are classified as 'advanced' activities.	All resource tenures (except mining leases) must comply with the land access laws.	<i>Mineral Resources Act 1989</i> <i>Petroleum and Gas (Production and Safety) Act 2004</i> <i>Petroleum Act 1923</i> <i>Greenhouse Gas Storage Act 2009</i> <i>Geothermal Energy Act 2010</i>
Compensation agreement (mining lease)	A compensation agreement must be signed by the resource company and the landholder before a mining lease can be granted.	Mining leases.	<i>Mineral Resources Act 1989</i>

Land access

Land access laws set the framework for a staged notification and negotiation process that resource companies must follow in order to access and undertake activities on private land. Under these laws, landholders have input over the conduct of activities and have the right to negotiate compensation for impacts they experience to their land and/or business as a direct result from resource activity on their land.

A landholder's right to be compensated is obligatory when a resource company proposes to undertake an 'advanced activity' (i.e. an activity likely to have a significant impact on a landholders' business or land use) on their land. Compensation can be as a result of the following:

- deprivation of possession of land surface
- reduction in land value
- reduction in land use including reduced use that could be made through any improvements to it
- severance of any land from other parts of the land owned by the landholder
- any cost, damage or loss arising from activities carried out under the land surface
- accounting, legal or valuation costs reasonably incurred by the landholder to negotiate or prepare a CCA, other than costs involved to resolve disputes via independent alternative dispute resources
- damages incurred by the landholder as a consequence of matters mentioned above.

Beyond compensation, these laws also set a statutory Land Access Code that all resource companies must comply with. The Land Access Code provides best practice guidance for *Recommencement of uranium mining - a best practice framework*

good relations and communications and sets mandatory conduct conditions for resource companies on private land. Some of the mandatory conditions include minimising disturbance to people, livestock and property and taking reasonable steps to prevent the spread of declared pests.

Compensation agreements (mining leases)

Mining leases under the *Mineral Resources Act 1989* (MR Act) permit the tenure holder to carry out activities associated with mining or promoting the activities of mining. The MR Act sets out that a mining lease will not be granted or renewed over private land unless a compensation agreement is agreed upon and signed between the registered landholder and the resource company, or, if the matter is expedited, determined by the Land Court.

Agricultural land and known uranium deposits

The Committee's research and consultation has identified that potential future uranium mining activity is likely to occur in north west Queensland. This region is well known for its enriched mineral resources, including significant uranium deposits, and is underpinned largely by mining activity. In 2011, mining represented the largest industry of employment in this region at 26.4 per cent (OESR 2011).

From an agricultural lands perspective, the region is primarily characterised by large grazing lands and a limited number of areas are identified as SCL. It is likely that should uranium mining develop in this region, it would not be within areas of known SCL. The Committee is satisfied that the current compensation mechanisms under the land access laws and compensation arrangements for mining leases will allow landholders, including farmers, to have input regarding the conduct of resource activity on their land, and to be compensated for impacts.

Recommendation 7.3

The Committee recommends that the current framework of compensation rights to landholders and the protection of prime agricultural land from mining should be maintained as it is appropriate for the recommencement of uranium mining. The UMOC should inform and educate landholders regarding this framework.

7.6 Employment opportunities

Employment opportunities arising from resource projects are addressed through a number of approaches. The Queensland Government position is that a cooperative approach is the best way to deliver proactive, effective strategies to maximise local content in constructing and operating major projects. The Queensland Government seeks to partner with private sector industry stakeholders to establish a new framework for local industry participation.

The goal is a collaborative approach that sees proponents actively encourage local industry involvement. This will be combined with targeted support for supply chain improvement to position local companies to win work.

The aim is to ensure local suppliers receive full, fair and reasonable opportunities, as a result of genuine industry ownership of local content principles. The approach will also allow proponents to reap the benefits and direct acknowledgement of their efforts toward the local jobs and business opportunities that result.

Identification of local employment impacts and proposed management strategies also form part of EIAs conducted by proponents for the Coordinator-General. This provides a detailed and transparent process for successful local employment and business development strategies. Chapter 8 outlines how these strategies and other specific measures can be applied to uranium mining projects to achieve best results for Indigenous community employment and business development.

Jobs, training and education were put forward as key issues by a number of submissions with specific reference to Indigenous employment. The resumption of uranium mining was identified as offering an opportunity for increased regional and Indigenous community development. This is of particular importance in areas where current mining projects are mature and in a declining employment cycle. Submissions raised this opportunity in the context of enabling robust, informed decision making for Indigenous groups and miners.

The Committee notes the importance of Indigenous Land Use Agreements (ILUAs) and Native Title agreements as existing mechanisms for developing employment and training programs for Native Title holders and groups responsible for country. Social impact assessments and regional plans provide transparent frameworks for broader employment and training measures. They also provide frameworks for the investment of royalties in education, training and employment projects for specific regional community groups including Indigenous workers from 'out of country', young people and women. The opportunities for increasing Indigenous community development are dealt with in more detail in Chapter 8.

7.7 Addressing social impacts

Social impact assessments (SIAs)

SIAs are a required component of the environmental impact statement (EIS) process for proposed resource projects under the *State Development and Public Works Organisation Act 1971* (SDPWO Act).

Direct and indirect social impacts are identified and examined for both positive and negative outcomes. Development proponents are expected to report on opportunities to avoid, mitigate, manage and offset negative social impacts and to identify opportunities to build on positive social impacts.

The Committee acknowledges that the Office of the Coordinator-General is currently updating its SIA Guidelines for resources projects to meet best practice.

The assessment should include a social overview and context that summarises:

- communities of interest likely to be affected across the lifespan of the project
- community history, culture and relevant events that have shaped the affected communities

- local and regional industries, including relative importance, industry lifecycles and resilience
- social description of the project including key assumptions and limitations to the assessment.

The proponent's social policy, principles and programs should be identified and described with reference to the applicability to the specific project and affected communities. The overview should clearly identify the proposed community and stakeholder engagement strategy. This means detailing an inclusive and continuous process between the proponent and communities over the life of the project that identifies social impacts and opportunities. The engagement strategy should also recognise and respect the desire of some communities to limit engagement.

The detailed SIA needs to outline a set of significant community issues arising from the preliminary analysis. The assessment should include a detailed social baseline study that focuses on the significant issues using quantitative and qualitative data, additional data collection where appropriate and the use of existing data from other sources such as the Office of Economic and Statistical Research.

The identification of impacts and opportunities as a result of the project should be a strategic and risk-based process involving representatives of the project, communities of interest, social practitioners, government and other relevant stakeholders. The project proponent should adopt an approach and methodology that will be both accepted internally within their organisation; and by the communities of interest. Ultimately the process implemented by the proponent will take into consideration the nature and capacity of the communities to participate.

The use of a risk-based approach enables mitigation and management to be directed to activities that will address the significant impacts and enable the most valuable opportunities.

Mitigation and management of social impacts

The SIA should describe the outcomes sought from mitigation and management, the actions proposed to achieve these and a robust performance measurement framework. The proponent and government should work together to manage social impacts, with parties accepting responsibility for specific measures. This can be aided by the use of specific agreements on these matters explicitly identifying responsibilities, timeframes, milestones and review requirements. Such agreements can be developed and framed to give communities input in the development of the social impact mitigation and management measures.

Reporting on the mitigation and management of social impacts is the responsibility of the proponent and a monitoring and review process should form part of the SIA. Compliance reporting requirements will form part of the development approval conditions with a monitoring and review plan to comprise part of the mitigation and management agreements. The reporting process provides the platform for informed dialogue between communities, the proponent and government over the life of the project.

Australian and international approaches

Emerging trends in the role of the resources sector in regional economic and community development are outlined in the Eurasia Group report *Mine 2011: The game has changed* (Price Waterhouse Coopers 2011). Internationally, the key issues for the mining sector are resource nationalism (including Australia's Minerals Resource Rent Tax), state capitalism, sustainability, community relations and government stability and transparency. The issues of sustainability and community relations and the level of government stability and transparency raised in the article are of greatest relevance to uranium mining (and processing) in Queensland.

The article suggests that community concerns over negative impacts to either the environment or society (human rights issues or indigenous community concerns) have been enough to close operations or change approvals rules. Equally, mining operations are seeking clarity and consistency in government processes and actions, enabling resource investors to make the long-term decisions necessary to invest in new operations.

Global communications mean that there are no 'backwaters' anymore. Any location or action can be filmed, recorded, photographed and made public in minutes or hours. Responses can mobilise internationally in hours or days. From the perspective of project proponents, strong positive relationships must be built with communities at the earliest opportunity and real, sustained, local and regional benefits delivered to avoid negative impacts.

Western Australia

A recent initiative in regional economic and community development in Australia has been the Government of Western Australia's Royalties for Regions program, which was established in 2009.

The *Royalties for Regions Act 2009* provides for the establishment of the Royalties for Regions Fund to promote and facilitate economic, business and social development in regional Western Australia. The Act also established the Western Australian Regional Development Trust. The Act provides a legislative base for the Royalties for Regions program's continuing operation (Department of Regional Development and Lands 2011).

A total of \$6.1 billion has been budgeted through the Royalties for Regions fund for the period 2008-09 to 2014-15, with \$1.49 billion allocated for 2011-12. Funding continues to be distributed across nine regions of Western Australia through three funds, which are administered by the Department of Regional Development and Lands.

However, it is not clear what the trigger processes are for an SIA for mining projects in Western Australia. The Western Australia Department of State Development undertakes assessment for designated state development projects (Department of State Development nd). Available information on mining project assessment does not clearly identify this responsibility for other projects.

South Australia

South Australia undertakes quarterly compliance monitoring and reporting on the environmental performance of its uranium mines. This comprehensive data is made available to the public, enhancing confidence in the industry. This process has been in place for approximately 10 years.

South Australian stakeholders noted in their submissions to the Committee that uranium mining is subject to a higher degree of scrutiny than other mining activities and an incident at one mine is an incident that can reflect on the industry as a whole.

In considering the current EIA being undertaken by BHP Billiton for the Olympic Dam expansion (BHP Billiton 2009), it is important to note that the scope of the social and regional economic impacts being addressed are quite similar to approaches mandated within the process overseen by the Queensland Coordinator-General.

It is, however, clear that uranium mining in South Australia operates within very different regional parameters for demographic, economic and social issues. Uranium mined at Olympic Dam is only one product of a very large mine producing copper, gold, silver and uranium.

Mining regions in Queensland are more densely populated than the far north of South Australia. All of Queensland is governed by local governments under the *Local Government Act 2009* whereas the Olympic Dam is surrounded by unincorporated lands and adjoins the Roxby Downs mining town and Olympic Dam mining village.

Uranium mining in Queensland will be one type of mine and economic activity competing with a range of other mining and economic activities for land, investment and infrastructure.

It is therefore difficult to draw conclusions from the South Australian approach to managing social and regional impacts other than to note the similarity of process followed and the significant level of scrutiny by government and the public.

International – Saskatchewan, Canada

As a point of comparison, one of the world's key uranium suppliers is the province of Saskatchewan, Canada. Saskatchewan is a minerals rich province (see below) and outlined here are details of how social impacts are captured in the Saskatchewan EIA process.

Mining

Saskatchewan is the world's largest producer of potash, a mineral critical to the fertiliser that global crops need. Its mines account for roughly 30 per cent of world potash production, and potash companies have announced \$13.2 billion worth of expansions to their existing mines by 2020.

Saskatchewan province is the second largest uranium producer in the world.

The Athabasca Basin, in northern Saskatchewan, contains the largest, high grade uranium deposits in the world.

Saskatchewan is Canada's third largest coal producer.

Saskatchewan's value of mineral sales was approximately \$8.1 billion in 2011.

Saskatchewan – Energy-Rich, Resource-Full (Source: Government of Saskatchewan 2013a)

Canada's provincial *Environmental Assessment Act* requires proponents to prepare an EIA for any development likely to have significant environmental impacts and obtain the approval of the Minister of Environment before proceeding with the development. The Department of the Environment provides detailed guidelines on this process, including a template for Terms or Reference (TOR) (Government of Saskatchewan 2012b, 2012c). Aspects of the TOR relevant to social impacts are outlined below. In particular, the TOR requires that valued ecosystem components (VEC) be addressed.

The TOR should list the VEC that will be considered during the EIA. In identifying VEC to list in the TOR, proponents should consult local communities, including First Nations and Métis communities, as well as area planning resources, for example, municipal or provincial land use plans, or the local Environmental Quality Committee.

Proponents are encouraged to consider relevant local and traditional knowledge and uses and to incorporate this information in the selection of the VEC.

VEC identified in the TOR should be selected and justified based on ecological importance, value to the existing environment, relative sensitivity of the environmental components to the proposed project and their relative social, cultural, or economic importance (e.g. medicinal herbs, traditional diet).

VEC for the socio-economic environment may include, but are not limited to:

- land use and management (including reasonably foreseeable future land uses)
- historic and heritage resources
- traditional land use
- human health and safety
- socio-economics (i.e. social and cultural conditions, aesthetics, transportation, navigation, housing, employment and economic diversification).

The TOR will require that proponents provide a plan showing how they will solicit public input in the project area and utilise knowledge of the local environment during the EIA process. In this plan, proponents should identify the groups they will engage, which should include community associations, municipal governments, regional planning agencies, First Nations and Métis communities, businesses, recreational users, and NGOs (Government of Saskatchewan 2012b).

International – other

In 2006, the United Nations Research Institute for Social Development research program on social policy in a development context identified multiple roles for social policy in production, protection, reproduction and redistribution (Hujo 2012). This analysis identifies the need in mineral rich countries to balance redistributive mechanisms with policy that encourages productive output and stable macroeconomic conditions.

Botswana, Chile, Indonesia and Norway are all highlighted as examples of countries that have combined economic policies, social policies and governance in ways to enable sustainable long-term management of mineral resources. Chile has implemented policies that encourage diversification while Botswana, Chile and Norway have created stable and transparent revenue systems. All have channelled revenues into social policies (Hujo 2012).

7.8 Addressing cumulative impacts

The Committee notes the commitments from the Queensland Government to examine the resource supply chains in the Bowen, Galilee and Surat basins and the North West Minerals Province to address the cumulative effects of development. The projects in these regions are geographically close to each other and similar in production timeframes. Development proponents, local governments and state agencies will be required to provide information and data to facilitate this examination.

Identification and assessment of cumulative impacts is one element of the EIS process under the SDPWO Act. The assessment of the contribution of individual projects to cumulative impacts is supported by work undertaken as part of regional planning processes and by work being undertaken through the resource supply chain studies now underway. The cumulative impact of a particular project can then be addressed through the conditions applied to an individual project.

7.9 Establishing ongoing community consultation

Submissions have indicated a need to build the community's understanding of uranium exploration, mining, processing, transport and export to establish a culture of transparency, and enable informed responses and decision making by communities to achieve mutually beneficial outcomes.

It has been identified and recommended in Chapter 4 that ongoing community consultation can be mandated and overseen through the establishment of the Uranium Mining Stakeholder Committee. This will provide an ongoing formal process of consultation,

supported by regulatory requirements or conditions in relation to significant changes in mining, processing or transport operations.

In order to be good corporate citizens, uranium proponents must also participate in ongoing direct communication with affected communities and ensure they engage with the community through the local government, local business organisations and community groups.

8: Indigenous rights, opportunities and challenges

Economic opportunities

The Committee found significant potential for the uranium industry to create real job opportunities for Indigenous Queenslanders, both through direct industry employment and supply chain opportunities for Indigenous businesses.

Despite a commitment by industry to Indigenous training and employment, there are significant social and cultural barriers to getting Indigenous people into and remaining in work. Indigenous businesses, like all businesses, need to achieve a basic level of competency in key aspects of their business before they can engage effectively with industry partnering opportunities.

New approaches to building capacity and addressing barriers are required if Indigenous Queenslanders are going to fully participate in the job and business opportunities provided by the uranium industry. These barriers are common to industries across the entire resources sector, and further effort to address them should commence immediately.

Accordingly, the Committee recommends that the Queensland Government work with industry and community stakeholders to establish a new training and business development initiative to help Indigenous people take advantage of the likely jobs to become available within the uranium mining industry, and other new opportunities in the resources sector. Such an initiative should consider how government and not-for-profit organisations can help improve outcomes from industry-led employment and training programs for Indigenous people.

This initiative could be in the form of a charitable trust arrangement, which could provide a sustainable source of funding for projects which support training, employment and business development outcomes. A proposal for this trust arrangement is outlined in Appendix F.

A Memorandum of Understanding (MOU) is already in place between the Queensland Government and the Queensland Resources Council (QRC) to encourage employment of Indigenous people in the resources industry. The Queensland Government should continue negotiations with the QRC on an updated MOU which outlines agreed priorities for increasing Indigenous economic participation in the resources sector, including those suitable for support by a charitable trust, as well as those more appropriately implemented directly by government or industry.

Rights

Many Indigenous considerations for uranium mining are common to mining developments generally. Consequently uranium mining should not be treated as substantially different to any other resources in the application of either Commonwealth or state laws protecting Indigenous rights and interests. Native Title parties have certain rights and interests protected by law, but all Indigenous people living in resource communities have the right to be protected from impacts and share in the benefits of uranium mining (as do other members of those communities). These rights should not be confused.

Environmental and social impacts

As with the broader community, the views of Indigenous people on the issue of uranium vary. Negotiations may involve multiple Traditional Owner groups, who may not always agree. There is no 'one-size-fits-all' response.

The particular environmental risks associated with uranium remain a cause of concern for many Indigenous communities. Uranium may be viewed as a threat in the context of Indigenous cultural and spiritual connection to the land. Amongst some Indigenous groups, lands where uranium resources exist have been traditionally referred to as 'poison country,' where disturbance creates danger and cultural protocols of avoidance have been passed down through generations.

Indigenous communities are also concerned about the impact of uranium mining on traditional hunting grounds and sources of bush tucker. The Committee recognises this concern and considers the rigorous approval process and standards to be applied to uranium mining, as discussed in detail in Chapters 4 and 5, should protect traditional hunting grounds and bush tucker.

Stakeholder feedback provided to the Committee indicates the importance of further two-way education in order for Indigenous people to continue learning about mining and mining opportunities, and for the mining industry to continue learning about Indigenous culture. The Committee considers the steps outlined in Chapter 4 will lay the groundwork for this consultation and education.

Finally, a willingness by the uranium industry to conduct respectful and culturally-sensitive engagement with Indigenous people—from the earliest stages of the project and on an ongoing basis—forms the basis for mutually-beneficial outcomes.

8.1 Background

Initially characterised by conflict and deep mistrust, the Australian uranium industry's relationship with Indigenous people has matured markedly over the past 25 years. Laws protecting Native Title rights and interests, cultural heritage, and environmental and social values, have combined with increased levels of corporate social responsibility to create the basis for more constructive engagement to occur.

Although these statutory frameworks have evolved following the closure of Queensland's last uranium mine in 1982, their impact can be seen in the improved level of cooperation and engagement between Indigenous communities and Queensland's resource sector more broadly.

The Queensland Government introduced legislation recognising and protecting Indigenous cultural heritage in 2004. This complemented existing environmental protection laws and Commonwealth Native Title laws that were introduced ten years earlier. By this time, Queensland resource companies were increasingly coming to recognise management of social impacts as a key commercial imperative. The Queensland Resources Council (QRC) formally committed to maintaining 'social licence to operate' as an industry goal in 2006

(Indigenous Employment and Business Development in the Queensland Resources Sector – Report to the QRC, June 2007, Centre of Social Responsibility in Mining, Page 1).

With some notable exceptions, such as the Century Zinc mine (which draws approximately 20 per cent of its workforce from local Indigenous communities), the economic gains for Indigenous people were initially limited. A study by the Centre for Social Responsibility in Mining found that in 2009, many companies in Queensland still did not have focused Indigenous employment programs. There was no comprehensive industry effort to train and employ Indigenous people on an ongoing basis. There was limited involvement by Indigenous businesses in the sector and little industry or government activity aimed at increasing that involvement. The study also found that substantially more dialogue between stakeholders was needed.

A more structured approach to Indigenous employment, training, and business participation has developed over the past five years. This has coincided with Queensland Government regulation of social impacts from major resource projects. In 2008, the state amended legislation to improve the assessment and management of social impacts from significant new or expanded resource projects. This period also saw a strengthening of government and industry Indigenous employment partnerships.

In August 2011, the Australian and Queensland Governments and QRC re-signed a new two year Memorandum of Understanding (MOU) committing 'to work in partnership with each other and with Indigenous stakeholders to create sustainable economic development and employment opportunities that will contribute to building strong and sustainable Indigenous families and communities in Queensland.'

There are two targeted regional partnerships under the MOU:

- the Bowen Basin Indigenous Participation Partnership (BBIPP)
- the North West Queensland Resources Industry Initiative (NWQIRII).

The NWQIRII covers the region where a number of Queensland's largest known uranium deposits are located. Many of Queensland's main deposits are in the North West Minerals Province around Mt Isa and Cloncurry (such as Mary Kathleen, Skal and Valhalla). There are more than 4500 Indigenous people living in this region representing more than 17 per cent of the overall Queensland Indigenous population. Key indicators of Indigenous disadvantage are high, with underrepresentation in education and training. Indigenous unemployment in these areas is more than 23 per cent.

The aim of the NWQIRII is to help maintain a social licence to operate, by providing pathways for Indigenous education, training and employment in the resources sector and increasing the opportunities for Indigenous businesses. The NWQIRII expires in 2013, with successor arrangements yet to be finalised.

8.2 Policy context

The Queensland Government's transformative vision for improving the lives of Indigenous Queenslanders is based on enhancing economic advantages. Its policy aim is to address the underlying cause of social disadvantage by maximising employment and business opportunities for Indigenous people. This report views the implementation of uranium mining in Queensland in that context.

With significant public and private resources being directed towards the challenge of addressing Indigenous disadvantage, there is little doubt that improved coordination between industry and government can help streamline effort and optimise outcomes.

Accordingly, the state is currently in negotiations with the QRC to update the existing MOU on Indigenous employment. This is one of four agreements the Queensland Government is negotiating with industry peak bodies for each of four pillars of the Queensland economy – tourism, resources, agriculture and construction.

The current MOU with QRC is being evaluated as part of these negotiations, which will also provide information about the effectiveness of the NWQIRII.

This was a key action under the Queensland Government's first Six Month Action Plan, and will be a vital component of the overarching policy for Indigenous affairs, an Indigenous economic participation framework which is due for release during 2013.

8.3 Barriers to Indigenous economic participation

Recommendation 8.1

That the Queensland Government should establish a 'mining training and business development initiative' for Indigenous Queenslanders in cooperation with industry to address the barriers preventing Indigenous people from taking full advantage of the jobs on offer in the resources sector. This could potentially be in the form of a charitable trust arrangement which could provide a sustainable source of funding for projects which support training, employment and business development outcomes. A proposal for this trust arrangement is outlined in Appendix E.

Recommendation 8.2

That the Queensland Government should continue negotiations with the Queensland Resources Council on an updated MOU which outlines agreed priorities for increasing Indigenous economic participation in the resources sector, including those suitable for support by a charitable trust, as well as those more appropriately implemented directly by government or industry.

In attempting to identify potential barriers to Indigenous economic participation in Queensland's uranium mining industry, the Committee found many issues which are common across mining industries. Given the commonality of issues across industries, and the scale of the problem, the Committee sees limited value in government focussing its responses to uranium mining. Rather, a new regional model for increasing economic participation in the whole resources sector is required.

Partnership approaches between government and industry aimed at boosting Indigenous economic participation in the resources sector are relatively new. Whilst the government's commitment to renegotiate its current MOU with the QRC recognises the potential value of such partnerships, government and industry are still learning which strategies are most effective.

Formal industry and company agreements do not guarantee delivery of positive Indigenous employment outcomes (Indigenous Employment and Business Development in the Queensland Resources Sector – Report to the QRC, June 2007, Centre of Social Responsibility in Mining, Page vii). Indigenous employment outcomes in the north west mining region over the past five years have been disappointing. Despite improved coordination and collaboration between stakeholders, the proportion of overall mining employees in the in North West who are Indigenous declined from 9.9 per cent to 7.5 per cent between 2006 and 2011. Despite the creation of 1200 jobs in the north west resources sector over the past five years, only 30 were filled by Indigenous people.

Although both industry and the vocational education and training sector provide pathways for Indigenous training and employment, these statistics show that opportunity alone is not enough to get people into and remaining in work. A complex mix of social, economic and cultural barriers prevents existing frameworks from meeting the needs of Indigenous job seekers and employers on a consistent basis.

A range of priorities for addressing barriers to Indigenous economic participation were identified under the current MOU with QRC. However the biggest impediment to action appears to be inadequate funding. Action plans developed under the MOU were funded with a joint contribution of \$750,000 over three years, which was sufficient to cover the cost of its administration. It is unsurprising, then, that little was achieved in terms of tangible outcomes, and that many issues remain unresolved.

Employers recognise that Indigenous people are at different stages of work readiness and skills development. Yet employees have certain minimum requirements that candidates must meet before accredited and on-the-job training can begin to take place. Many report a challenge identifying suitably equipped candidates.

Many job seekers need targeted support in areas like literacy and numeracy, management of health issues, and drug and alcohol rehabilitation before they are ready for training. NGO programs such as Myuma near Camooweal and the Salvation Army Employment Plus provide such pre-vocational training and have had some success, however they are unfunded on an ongoing basis. Furthermore, the required industry standard for skills and attributes to be achieved prior to employment will differ for different work roles. Therefore, a single pre-vocational program will not be appropriate for all job seekers and all work roles.

There are issues with the effectiveness of Commonwealth job service agencies, with a low proportion of job placements in the mining industry filled with their assistance. Job service agencies generally cannot provide the sorts of intensive support some Indigenous job seekers require, and employers reportedly find it frustrating and time consuming to have to deal with numerous, fragmented employment and training organisations to achieve a particular workplace outcome. The Commonwealth needs to do more to improve the effectiveness of job service agencies for Indigenous job seekers and employers.

Moreover, the problems that prevent Indigenous people getting into work are not often immediately resolved by earning a job, with low training completion and workplace retention rates another issue. Although many companies have in-house support available, this is less effective at assisting Indigenous people with personal problems than ongoing relationship-based mentoring and case-management delivered by a trusted external third-party. There is no funding currently available for these sorts of services.

Many Indigenous candidates suited for higher skilled roles in the resources industry lack the resources and family support to engage fully with higher learning opportunities. Given it will be several years before Queensland's first uranium mine is ready to commence, highly

skilled Indigenous candidates should be identified now to commence the tertiary training required for uranium industry specific roles.

In addition to strategies for increasing industry employment, government also needs to address the barriers facing Indigenous businesses. Mature Indigenous businesses provide enduring and sustainable benefits for their owners, and a sense of economic empowerment and self-determination beyond that derived from earning a wage. They also represent an important alternative source of employment for Indigenous people to mainstream industry employment. The work environment within Indigenous businesses may be more suitable than those within large mining companies, which require a greater cultural adjustment. This can be particularly so for Indigenous people more accustomed to traditional lifestyles.

Although industry has demonstrated a commitment to support longer term capacity building for Indigenous businesses (for example through joint venture supply arrangements for its projects), this is not sufficient to secure outcomes. Indigenous businesses, like all businesses, need to achieve a basic level of competency in key aspects of their business (including tendering) before they can engage effectively with such industry partnering opportunities.

These are just some of the issues which prevent opportunities being converted to Indigenous employment or business outcomes. It is important that governments act now, with potential job opportunities for Indigenous people projected to increase significantly over coming years – not just from uranium mining. The QRCs *Queensland Resources Sector State Growth Outlooks Study* in November 2011 warned that a shortage of several skills sets is likely to impede the expansion of Queensland's resources sector over coming years unless there are appropriate interventions. Many of the occupations in the high need category are suitable for entry level candidates and can therefore be targeted for unemployed and underemployed Indigenous people.

While the Committee recognises the need for greater coordination with industry on the barriers to Indigenous training, employment and business development, it recommends that such arrangements be appropriately resourced. The Committee suggests that sustainable and predictable funding models, such as a charitable trust incorporated in a cross-sectoral partnership, could bring the certainty required for more strategic and long-term solutions to these problems. How such an arrangement could work is outlined further in Appendix E.

A charitable trust would complement the MOU the government is negotiating with the QRC for boosting Indigenous economic participation, but it's important that its activities not replace existing effort. The MOU with QRC can be a valuable mechanism for agreeing to priorities, but should recognise the difference between those suitable for support by a charitable trust, and those more appropriately implemented by government and/or industry directly.

Consultation with stakeholders in the north west region indicates that such an initiative would likely find strong support. Mt Isa City Council has been particularly proactive in promoting the potential employment, training and wealth development potential uranium mining may represent for local Indigenous people. Feedback provided to the Committee from Burke Shire Council indicated that when the Century Zinc mine winds down in 2016, new work opportunities will be required for its skilled workforce of some 200 Traditional Owners.

8.4 Statutory frameworks

Recommendation 8.3

The Queensland Government should not substantially differentiate uranium from other significant resource projects in the application of statutory processes related to Indigenous interests.

A combination of Australian and Queensland law exists to protect the rights and interests of Indigenous parties in dealings with the mining industry.

For mining projects deemed to be significant projects in Queensland, there are three distinct elements to the consideration of Indigenous interests:

1. Engagement with Traditional Owners regarding potential impacts on Native Title rights (as required under the *Native Title Act 1993 (Cwth)*).
2. Engagement with Traditional Owners regarding management of cultural heritage (as required under the *Aboriginal Cultural Heritage Act 2003 (Qld)*).
3. Social impact assessment and management (as required under the *Environmental Protection Act 1994 (Qld)* or *State Development and Public Works Organisation Act 1971 (Qld)*).

There is no clear evidence from other jurisdictions that uranium mining should be treated substantially differently to other resources in the application of these laws. Some Traditional Owner groups subsequently reported gross inadequacies in consultation for the commencement of the project, which fuelled protests and generated negative publicity for the industry.

Notwithstanding considerable improvements in standards of corporate social responsibility since the commencement of Olympic Dam, such regulatory exemptions should be considered contrary to the objective of promoting public confidence in the uranium industry and promoting deep and genuine engagement between uranium companies and Indigenous communities.

Native Title

Virtually all Queensland's uranium deposits are located on lands subject to a Native Title claim or determination.

Native Title is the recognition by Australian law that Aboriginal people have rights and interests to their land that come from their traditional laws and customs.

Native Title rights and interests may include rights to:

- live on the area, access the area for traditional purposes, like camping or to do ceremonies, visit and protect important places and sites
- hunt fish and gather food or traditional resources like water, wood and ochre
- teach law and custom on country.

Activities which have the potential to limit the ability of Traditional Owners to enjoy their Native Title rights and interests are referred to as 'future acts.'

The *Native Title Act 1993 (Cwth)* establishes a number of statutory pathways to compensate Native Title parties for the loss or extinguishment of Native Title.

The two processes used to deal with applications to mine, explore or prospect for minerals are an Indigenous Land Use Agreement (ILUA) or the right to negotiate process (*ILUA or the right to negotiate process? A comparison for mineral tenement applications*, 2008, Native Title Tribunal).

The right to negotiate process is formal, lengthy and may involve arbitration. ILUAs are agreements between Native Title parties about how land and waters in the area covered by the agreement will be used and managed in the future and how impacts of the project on Native Title rights and interests will be managed and compensated for.

As per recommendation 8.3, there is no basis for substantially differentiating between uranium resources and other resources in how the consent of Traditional Owners is achieved. This is particularly the case given that Native Title negotiations occur under Commonwealth legislation which prescribes a specific role for the state.

The Queensland Government, which is committed to resolving Native Title issues through negotiation rather than through costly and time consuming litigation, has previously supported the use of ILUAs by the mining industry. The Commonwealth Government's submission to the Committee notes that ILUAs are commonly used in Queensland to resolve Native Title issues.

There are, however, some issues for the state to consider in the context of its regulatory oversight of the uranium industry.

A perceived advantage of ILUAs is their flexibility to deal with a range of issues in a single agreement. In addition to compensation for the loss or impairment of the Native Title rights and interests, an ILUA may also deal with cultural heritage protection and/or measures intended to mitigate or offset social impacts.

For example, the ILUA between Queensland Gas Company (QGC) Limited and the Mandandanji People relating to its Queensland Curtis LNG project provides consent for a range of acts within the project area (including future acts), in return for a 'life-of-project benefits package' which addresses cultural heritage and social risks identified in the QGC social impact assessment. As with most ILUAs, the specific contents of the package are confidential.

Once an ILUA is agreed, it is registered with the Native Title Tribunal and is binding. These binding negotiations are often concluded in advance of any State Government requirement for an environmental impact statement (which triggers the requirement to complete a cultural heritage management plan and social impact assessment). Indeed, mining companies can comply with the cultural heritage legislation through the ILUA process, but this arguably serves to constrain the regulatory influence of the state at the impact assessment stage of the project.

While ILUAs can be an effective way for mining companies to meet their Native Title obligations, it is important that their confidentiality and flexibility not limit or constrain the state's ability to exercise its regulatory responsibilities effectively. A study by the Centre for Social Responsibility in Mining, undertaken for the Queensland Government in 2009, found that such agreements can complement effective regulation, but are not an acceptable substitute for strong requirements set out by the state (*Leading Practice Strategies for Addressing the Social Impacts of Resource Developments*, Centre for Social Responsibility in Mining, University of Queensland, November 2009, Page 44).

Ensuring strong, effective and transparent regulation of uranium mining in Queensland will be vital to ensuring the industry earns and maintains the confidence of communities and stakeholders. This is addressed further under the sections on cultural heritage and social impact assessment below.

Indigenous cultural heritage

Although the management of cultural heritage may be addressed under an ILUA or other Native Title agreement, the *Aboriginal Cultural Heritage Act 2003 (Qld)* (ACH Act) provides specific protection whether or not the cultural heritage has previously been identified.

The ACH Act defines cultural heritage as anything that is a significant Aboriginal area, a significant Aboriginal object or archaeological evidence of Aboriginal occupation of an area. Identifying these values can be difficult as they are often intangible.

The ACH Act explicitly recognises that cultural heritage may lie below the surface, and places obligations on extractive land users to exercise a duty of care. That is, they must take all reasonable and practical measures to ensure their activity does not harm Aboriginal cultural heritage.

For most mining activities, these measures are required to be agreed with the Indigenous party (usually the Native Title party) and reflected in a cultural heritage management plan (CHMP) or similar agreement. Although many mining companies voluntarily choose to commence a CHMP prior to exploration, the legal requirement for a mandatory CHMP is triggered by the commencement of an environmental impact statement. The ACH Act provides that there is no requirement for a CHMP where cultural heritage is addressed in some other agreement, such as an ILUA.

As was the case with Commonwealth Native Title laws, the Committee considers the existing process for the protection of Indigenous cultural heritage is largely sufficient for uranium mining.

Bush tucker

Traditional Owners raised concerns about the impact of uranium mining on traditional food sources, or bush tucker.

Bush tucker is a key aspect of Indigenous culture. Many communities continue to maintain the customs associated with bush tucker that has been passed down through generations.

Indigenous men hunt local game with spear, including kangaroo, magpie geese, bush turkey and wallaby which are brought back to camp and cooked over hot coals. The bush produces many fruits, vegetables and seeds not included in mainstream diets, in addition to edible grubs and insects, and Indigenous sweet-foods such as nectar, tree gum and honeypot ants.

While bush tucker is important from a cultural perspective, it is also important for the general health of Indigenous people, who may not be used to diets containing wheat and refined foods.

The Committee recognises the concerns it heard on this issue during consultation, and considers that rigorous approval process and standards to be applied to uranium mining, as discussed in detail in Chapters 4 and 5, should protect traditional hunting grounds and bush tucker.

Uranium and 'poison country'

Uranium itself may have particular cultural significance for some Indigenous groups, which needs to be carefully managed. The cultural significance some groups ascribe to uranium derives from their cultural connection to the land. Land is at the heart of the Indigenous belief system – the land and the people in it are interconnected and inseparable. Despite huge regional differences in Indigenous cultural practices across Australia, the importance of land to culture and identity is universal.

The strong spiritual connection and sense of belonging that Indigenous people feel for the land extends to the plants, animals, waterways, and places of cultural significance and importance that are present on it. In this context, some special sites are considered sacred, others are regarded as 'danger places' or 'poison country'. Just as the term 'poison' is often associated with avoidance in traditional Indigenous kinship customs, poison country also carries certain cultural obligations.

The reasons for designating land as poison country can vary between Indigenous groups, depending on ancestral stories. However, it is recognised amongst some Indigenous groups as a specific reference to land where uranium deposits exist, and the environmental risks associated with its disturbance. Traditional knowledge transmitted across generations obliged them not to go to these places to hunt, or collect food and established cultural protocols of avoidance. This appears to be the main factor which differentiates uranium from other resources from an Indigenous cultural perspective.

These cultural heritage considerations intersect with the other environmental and health-related concerns identified by the Committee during their consultations with Indigenous people.

It should be noted that given the extractive nature of uranium mining, cultural values based on the non-disturbance of poison country may be lost if a project proceeds, irrespective of the management regime put in place. Some groups may be more attached to those cultural values than others, and less willing to accept their loss. This may be particularly so for those who maintain more traditional ways of life. Others may be willing to support a harm minimisation approach through appropriate management of ores and waste, subject to compensation for loss of cultural heritage.

Although not provided for in a CHMP, compensation for loss of cultural heritage could form part of a Native Title agreement or an ILUA.

Successful negotiations between uranium miners and Indigenous parties demonstrate that it is possible, if difficult, to successfully manage the tension that exists between uranium mining and the cultural significance of poison country. Appropriate recognition of the cultural significance of uranium for some Indigenous people, coupled with strong environmental management regimes, can be critical to uranium miners earning and maintaining their social licence to operate

Social impact assessment

Recommendation 8.4

The Queensland Government should consider how any future changes to the social impact assessment process can encourage greater consistency, transparency and alignment with government programs in the management of social impacts for Indigenous communities.

Effective social impact management can be an important means of Indigenous economic development. While rights and interests related to Native Title and Indigenous cultural heritage are clearly and specifically defined in legislation, social impact management provides scope for addressing broader impacts to Indigenous communities stemming from large-scale resource developments.

The management of social impacts has been regulated by the state since 2008. A social impact assessment is undertaken for all new or expanded resource projects required to prepare an environmental impact statement under the *Environmental Protection Act 1994 (Qld)* or *State Development and Public Works Organisation Act 1971 (Qld)*.

Under current government policy for social impact assessment, proponents are required to develop a social impact management plan (SIMP) to facilitate the ongoing management of identified impacts. SIMPs outline the forecast changes to communities in terms of local and cumulative effect and the agreed strategies for mitigating the effects on various parties, and their implementation are a condition of project approval.

To date, the Coordinator-General has approved four SIMPs:

- the Origin Energy APLNG project
- the Santos Gladstone LNG project
- the Queensland Gas Company Queensland Curtis LNG project
- the Xstrata Wandoan Coal Mine.

The Office of the Coordinator-General is currently working with agencies to examine changes to the existing processes for social impact assessment. This provides an opportunity to assess the effectiveness of current arrangements in addressing Indigenous issues.

Entrenched social and economic disadvantage may lead to Indigenous people being disproportionately impacted by uranium mining compared to the general community.

While risks will differ depending on the particular community, there are some common categories of disadvantage that should always be considered as part of a social impact assessment:

- poorer health may render Indigenous people more susceptible to adverse health outcomes from uranium projects
- lower levels of home ownership mean that Indigenous people will tend to be impacted more by higher rents from changes in housing availability
- lower average incomes will also mean that Indigenous people will tend to be impacted more by other cost of living increases
- lower than average levels of education and training can limit opportunities for Indigenous members of the community to benefit from resource industry job creation, exacerbating inequalities in employment.

Consistent with the commitment of industry to maintain social licence to operate, project proponents have, to date, considered these sorts of issues in their social impact assessments. This has been largely voluntary. The government's social impact assessment guidelines do not require any consideration of Indigenous issues beyond the inclusion of 'Indigenous stakeholders' in a community engagement plan (Social Impact Assessment, Guideline to preparing a social impact management plan, September 2010, Department of Infrastructure and Planning, Queensland Government).

As a consequence, there has been little consistency in how companies addressed Indigenous social impacts. This makes it difficult to compare SIMPs and determine if the actions they propose are adequate, inadequate or go further than might reasonably be expected. The willingness of companies to voluntarily address Indigenous issues in the absence of any government requirement should be both acknowledged and encouraged.

However, the process could benefit from government providing clearer guidance, particularly around the monitoring of impacts and outcomes. Progress reports published to date tend to focus more on the implementation of SIMP commitments, rather than the outcomes that address the potential impact (see text box below). With reporting focussed on implementation rather than outcomes, there is no certainty that SIMP commitments are addressing the right problems, or addressing problems effectively.

Another issue is the potential 'bundling' of compensation for social impacts, with that for loss of Native Title rights and interests and cultural heritage under an ILUA. It is not possible to ascertain from the approved SIMPs if, and to what extent, impact management actions identified in the plan are also provided for under the ILUA and how they relate to or overlap with other forms of compensation.

Conditions set by the Coordinator-General intended to mitigate and offset Indigenous social impacts ought to be transparently additional to any compensation that might be negotiated for loss of Native Title or cultural heritage. There are many reasons for this:

- Native Title rights primarily relate to the use of lands for traditional purposes not social impacts felt in an urban context
- combining social impact measures with compensation for Native Title rights and interests may limit the overall benefits that those community members might otherwise be entitled to receive
- Native Title rights may not extend to all members of a resource community
- consent for future acts is generally required at a point in the significant project approvals process before the extent of social impacts can be credibly assessed.

Social impact management plan – Queensland Curtis LNG project

The SIMP for the Queensland Curtis LNG project is one of four approved to date by the Coordinator-General.

Prepared in 2010 and approved in April 2012, QGCs SIMP includes plans with timeframes to manage social impacts and maximise benefits around six themes, one of which is Indigenous participation. It outlines the process followed for consultation with Traditional Owners and other Indigenous organisations, and the issues they identified.

The QGC Action Plan for Aboriginal Participation includes commitments to develop a strategy for Indigenous training, employment and business development and for investment in Indigenous social infrastructure, health and housing.

The SIMP undertakes to invest at least \$150 million across all six themes. Indigenous representatives on the Regional Consultation Committee provide ongoing advice on community development priorities.

QGC's 12 month SIMP progress report highlights that it has undertaken a number of actions to support Indigenous community members, including the following:

- Developed the Indigenous Training, Employment and Business Development Strategy working towards a target of five per cent Indigenous employment.
- Worked with Indigenous people to protect their cultural heritage during construction through the implementation of cultural heritage management plans.
- Worked with major contractors to develop Indigenous participation plans and monitored the success of these plans through six monthly reports.
- Sponsored a forum of well engineering companies to discuss employment opportunities for Indigenous people in drilling coal seam gas wells.
- Started a training program for Indigenous drillers, with the first intake in April 2012 of about 90 places throughout 2012.
- Supported the development of a viable business plan for a mobile health clinic to make preventative and primary health care services more accessible to Indigenous people living in project areas.
- Supported eight school-based apprentices.
- Worked with security contractor MSS Security to support the delivery of a training program for Indigenous people, with the potential for Indigenous trainees to gain employment with MSS Security.

8.5 Consultation, negotiation and community engagement

As outlined in the sections above, Commonwealth and Queensland laws prescribe certain requirements in relation to consultation and negotiation on a range of Indigenous rights and interests.

There are requirements to negotiate with Traditional Owner groups or their representatives around Native Title and cultural heritage management as well as requirements to include Indigenous stakeholders in a community engagement plan for the management of social impacts. These processes may be separate, or may overlap.

Role of the state government

These overlaps create a conflicted role for the state in consultation and negotiations with Indigenous people. On the one hand the state is required to be a neutral mediator of Commonwealth negotiations. On the other, it has its own legislative responsibilities and policies to pursue.

Several of the Committee's recommendations are aimed at improving coordination between government, industry and community stakeholders to enhance economic outcomes for Indigenous people from uranium mining.

There are, however, appropriate limits to the state's influence. Although the state government can grant a uranium mining permit, it cannot grant a social licence. This is an unwritten contract between communities and resources companies, which obliges industry to consult, negotiate and engage with communities to ensure their concerns are recognised, respected and satisfactorily addressed.

The very nature of the social licence to operate concept means that it is ultimately a matter for project proponents and Indigenous communities to negotiate outcomes that are mutually-agreeable. Attitudes to mining may differ within and between Aboriginal groups, as will their economic development priorities – parties are entitled to reach agreements that address these issues as they see fit.

Achieving consent

While there can be no 'one-size-fits-all' response, achieving consent is in the interests of all parties. Failure to achieve consent can result in delayed approvals, stimulate protest and harm public confidence in the industry, and make Indigenous people less likely to engage with economic opportunities presented by uranium mining.

Since the introduction of the *Native Title Act 1993*, Indigenous people have become more experienced in negotiation and more active in pursuing employment and business opportunities through mining activity on their land. However, the desire to embrace economic opportunities does not negate their cultural obligations and duty of care to the land.

Achieving consent therefore requires a commitment by industry to understanding and addressing the concerns of Indigenous people with respect and cultural sensitivity.

Patience is also required. Although neither the processes for ILUA or right to negotiate have set time frames, administrative requirements mean that neither process can realistically be completed in less than 12 months (*ILUA or the right to negotiate process? A comparison for mineral tenement applications*, 2008, Native Title Tribunal).

The process may take much longer – potentially many years – particularly when arbitration is required or when agreements are contested. Given the need to maintain public confidence in Queensland’s uranium industry, it is in the interests of proponents to engage all relevant parties from the outset, and adopt an approach to consultation premised on avoiding lengthy arbitration.

Consent has a specific meaning under the *Native Title Act 1993*¹, but also applies in a broader sense to the concept of social licence to operate. This is the difference between proponents meeting their legal obligations, and undertaking a sustained effort to earn and maintain the confidence of all stakeholders – even those that might initially disagree.

Feedback from Traditional Owner groups provided to the Committee was that consultations should not only occur at the earliest possibility, but be ongoing throughout all subsequent stages of resource exploration, project planning, evaluation and operation. In all cases, consultation must include people who are to speak for the area, usually the Traditional Owner groups or their nominated representatives (*Working with Indigenous Communities, Leading Practice Sustainable Development for the Mining Industry*, Department of Industry, Tourism and Resources, Australian Government, page 22). It is also essential that Traditional Owner group boundaries are recognised and clearly understood as part of any consultation process.

Consultation fatigue

Recommendation 8.5

The Queensland Government should advocate for the Australian Government to examine measures that minimise demands placed on Traditional Owner groups created by negotiating with multiple mining companies under Commonwealth laws.

With the resources sector increasingly recognising the benefits of extensive consultation with Indigenous people, a perverse consequence is that many report increasing consultation fatigue. This was one of the most common issues raised with the Committee during its investigations.

Native Title claims and determinations may apply to large areas of land, over which there may be many applications for exploration and mining permits. Sometimes tenure overlaps, allowing exploration for minerals and petroleum to occur concurrently. In each instance, the Traditional Owners must engage in the processes outlined above – attending meetings with industry, consulting internally, seeking and receiving legal advice.

Consultation fatigue will be an issue encountered by the uranium industry, given it is most acute in areas subject to intensive mining activity, such as the North West Minerals Province. The North West Minerals Province is extensively covered with existing mineral exploration permits, including for uranium. There is also growing interest in the region from the gas industry.

The demands of negotiating with multiple mining companies simultaneously means slower progress for all negotiations. Any sense that Indigenous parties are being pressured can

¹ The *Native Title Act 1993* requires the proponent to negotiate with the Native Title party in good faith to achieve consent to a future act. When this cannot be achieved through the right to negotiate process, the Native Title Tribunal may elect to make a consent determination.

cause negotiations to deteriorate. Given that Native Title is a Commonwealth process, the Queensland Government has limited options for assisting Traditional Owners resolve these issues.

One option consistent with the Queensland Government's limited jurisdiction on this issue would be to encourage the Commonwealth Government to work towards appropriate solutions to help improve the capacity of Traditional Owners to meet their obligations under Commonwealth law.

Appendix 1: The population by Indigenous status (a), unemployment rate, Year 10 and Year 12 completion rate (b) and per cent employment in mining (c) for selected Local Government Areas (LGAs) within proximity to major uranium deposits in Queensland, 2011

LGA	Indigenous s	Non- Indigenous	Person s	Per cent Indigenous	ATSI Completed Year 10 (%) (d)	ATSI Completed Year 12 (%) (c)	ATSI Unemployment Rate (%) (e)	ATSI Employed in Mining (%) (f)
Burke (S)	192	377	569	33.7	27.0	31.0	6.9	51.9
Cloncurry (S)	801	2,609	3,410	23.5	23.9	23.7	19.3	15.5
Doomadgee (S)	1,302	102	1,404	92.7	52.2	10.4	24.2	2.7
McKinlay (S)	37	1,049	1,086	3.4	20.7	24.1	13.0	100.0
Mount Isa (C)	3,748	18,507	22,255	16.8	26.8	24.9	18.1	22.5
North West uranium deposits	6,080	22,644	28,724	21.2	32.0	21.6	18.8	20.3
Charters Towers (R)	1,022	11,439	12,461	8.2	23.7	24.8	27.0	20.4
Croydon (S)	81	241	322	25.2	28.3	17.4	42.9	0.0
Etheridge (S)	33	882	915	3.6	29.2	25.0	0.0	100.0
Flinders (S)	106	1,739	1,845	5.7	23.9	17.9	0.0	0.0
Tablelands (R)	4,883	40,360	45,243	10.8	24.9	19.3	28.8	5.1
Eastern uranium deposits	6,125	54,661	60,786	10.1	18.3	14.9	27.9	8.4
Total	12,205	77,305	89,510	13.6	23.9	17.6	23.0	15.3

Sources:

- (a) Government Statistician, Queensland Treasury and Trade, Population estimates by Indigenous status, local government area, age, sex, 2001 to 2011 Geographical Classification)
- (b) Australian Bureau of Statistics 2011 Census of Population and Housing, IP06
- (c) Australian Bureau of Statistics 2011 Census of Population and Housing, TableBuilder Basic

Notes:

- (d) Indigenous who completed year 10/12 is calculated as a percentage of total Indigenous persons aged 15 years and over who are no longer attending primary or secondary school.
- (e) Applicable to persons aged 15 years and over.
- (f) Indigenous employed in mining is calculated as a percentage of total Indigenous persons who stated their industry of employment.

9. Resource royalties and charges

9.1 Introduction and Committee recommendations

In Australia, mineral resources are assumed to be owned by the community. Governments, on behalf of the community, assign exploration and production rights to the private sector in return for a resource royalty payment. The objective in resource royalty policy is to enable the government to collect a reasonable return from the extraction of the community's mineral resources while ensuring that the costs of the policy are not excessive. These costs include the administrative costs to the government and industry as well as any negative distortions to private investment and production decisions.

Interstate and international jurisdictions largely favour 'ad valorem' royalties on uranium (a royalty based on a fixed percentage of the value of the mineral), while some jurisdictions apply higher rates as prices increase (tiered royalty rates based on value). In Australia, South Australia and Western Australia apply royalties at a rate of five per cent (although they differ in determining the value for royalty purposes) while the Northern Territory applies a rate of 20 per cent to a measure of profit.

Currently in Queensland, a royalty for uranium would fall under the catch all provision of 'other minerals' at a rate of 2.5 per cent of value (which reflects that uranium is not currently mined).

It is important to ensure that both the royalty rate and the measure of value subject to royalty provide the appropriate level of compensation to the state. The Committee agrees that Queensland should set uranium royalties at a rate that is both competitive and delivers a fair return to the state. Royalties are the means by which a mining company effectively 'pays' for a resource that is owned by the people of Queensland. A royalty rate of five per cent is recommended for uranium, consistent with other states.

Recommendation 9.1

The Committee recommends a competitive royalty rate of five per cent should be introduced for uranium, which is consistent with other states.

However, the Committee recommends the Government should request Queensland Treasury and Trade to investigate applying a higher royalty rate for when uranium prices are particularly high.

Recommendation 9.2

The Committee recommends that a higher stepped royalty rate should be investigated by Queensland Treasury and Trade, which could come into force when market prices for uranium are very high.

The Committee acknowledges the suggestion from industry that any proposal along these lines should apply 'indexation' where the price set for the higher royalty rate should increase by the rate of inflation. The majority view of the Committee is that this represents a precedent for a broader change to the policy on royalties, and is outside the scope of the Committee's Terms of Reference (TOR).

Given the increasing global competition for capital for new uranium projects, and the infancy of the Queensland uranium industry, the Committee considers it reasonable that some form of 'new mine' concessional rate be considered for the early years of a new Queensland uranium mine.

Recommendation 9.3

The Committee recommends the Queensland Government should consider a 'new mine' concessional royalty rate of 2.5 per cent, regardless of the price of uranium, for the first five years of each new mine's life.

The Committee believes the Queensland Government can play a further role in supporting the state's economic development in this industry, as a concessional rate for new mines may not be the sole factor determining whether a new mine proceeds or not. Other factors in resource investment decisions are:

- expectations of future commodity prices
- exchange rate expectations
- estimated costs of exploration, development, extraction, processing and delivery.

In South Australia, an application can be made to the Minister to designate an operation as a 'new mine' whereby it would attract a concessional rate of two per cent, applicable for the first five years of operation. The royalty rate in this jurisdiction is defined as 'ex-mine gate value' and allowable deductions include costs for transport and shipping. This reduces South Australia's effective royalty rate to less than two per cent for 'new mines'.

In addition to the payment of royalties, the Committee recommends the uranium mining industry face the usual cost recovery mechanisms that are applied to other mines. Consistent with the overall findings that uranium mining should proceed largely within the existing approvals framework for other resource projects, the Committee does not see a need for a schedule of fees to apply specifically to uranium mining.

However, regulatory agencies should have flexibility as part of their usual periodic review of fees and charges to recover any additional assessment or monitoring costs.

Recommendation 9.4

The Committee recommends the usual cost recovery mechanisms applicable in Queensland should be applied to uranium, including tenure and environmental authority application fees, rent and the safety and health levy. Any additional assessment or monitoring costs as a result of uranium mining should be recovered from industry.

9.2 Mineral royalties

Royalty overview

A royalty represents a payment to the owners of a resource for the right to sell, dispose of, or use the resources. A royalty is payable on the basis that the state generally has an interest in all minerals located on or below the surface of land and all petroleum produced to the surface of land or in a natural underground reservoir in Queensland.

Royalty clients must comply with their obligations under the Mineral Resources Act 1989 (MR Act) (in respect of minerals) and the Petroleum and Gas (Production and Safety) Act 2004 (in respect of petroleum) and related regulations.

Royalty systems and rates vary between jurisdictions and commodities. Royalties are generally calculated on the following bases:

- specific royalty rate (a fixed dollar amount per quantity of commodity, for example per tonne)
- ad valorem royalty (a fixed percentage of the value of the mineral or petroleum)
- profit-related royalty (also referred to as a resource rent tax)
- hybrid royalty (for example specific royalty rate combined with a profit component).

Queensland's royalty regime

The majority of royalties charged in Queensland are based on the ad valorem (value) basis, calculated as a percentage of the value of the mineral or petroleum. The royalty rates applicable from 1 October 2012 for the major resources mined in Queensland are shown in Table 9.1.

Table 9.1 Queensland's royalty rates from 1 October 2012

Mineral	Rate	Details	2011-12 royalties (\$m)
Coal	For coal price: <= \$100 <ul style="list-style-type: none"> • All – 7% >\$100 and <=\$150 <ul style="list-style-type: none"> • First \$100 – 7% • Balance – 12.5% > \$150 <ul style="list-style-type: none"> • First \$100 – 7% • Next \$50 – 12.5% • Balance – 15% 	Based on the average price per tonne for the period.	2,386
Petroleum and gas	10% of well head value		
Base and precious	Variable rate between 2.550% and 5% (depending on average metal prices).	Attracts processing discount ¹ (except gold and silver). Attracts royalty free threshold. ²	
Bauxite	Non-domestic: The higher of 10% of the value of the bauxite or \$2.00 per tonne. Domestic: The higher of 75% of the calculated rate per tonne for non-domestic bauxite or \$1.50 per tonne.		
Iron ore	For average price per tonne: \$100 or less <ul style="list-style-type: none"> • \$1.25 per tonne > \$100 <ul style="list-style-type: none"> • \$1.25 per tonne plus 2.5% of value above A\$100/tonne 	Attracts processing discount.	
Other mineral (a material for which a royalty rate is not already prescribed in a regulation).	2.5% of value	Attracts royalty free threshold.	

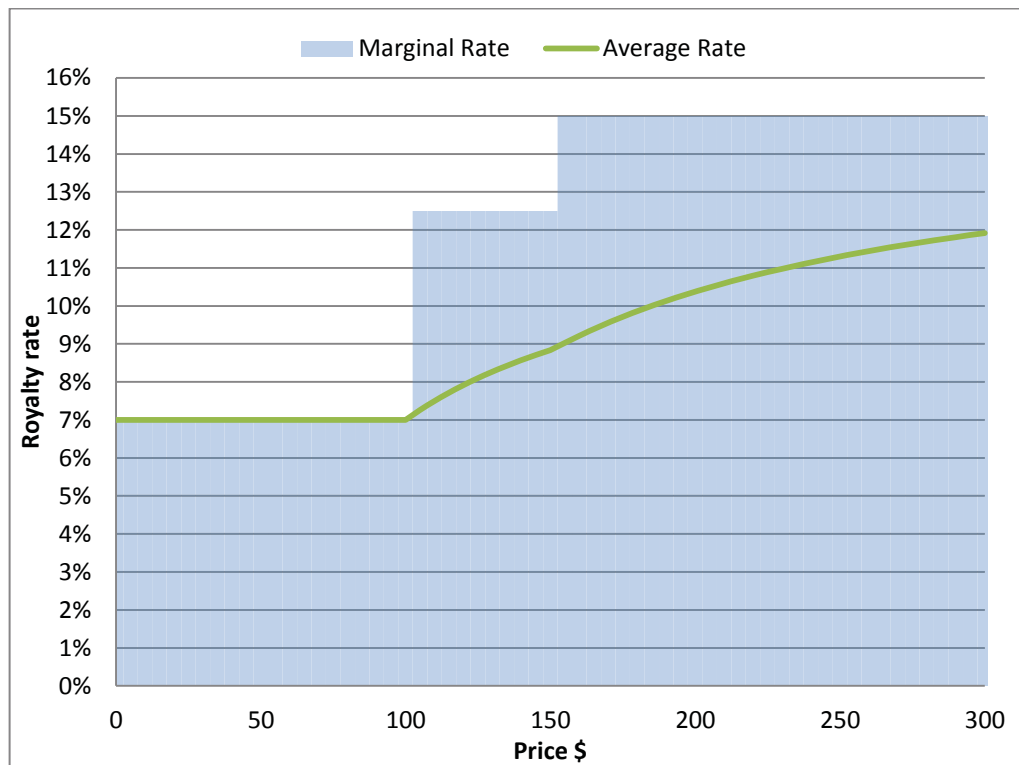
¹ A royalty discount applies for base minerals processed within Queensland to a particular metal content, as prescribed by section 39, Mineral Resources Regulation 2003.

² No royalty is payable on the first \$100,000 of the combined value of certain minerals sold, disposed of or used in a year. Source- <http://www.osr.qld.gov.au/royalties/rates.shtml>

Ad valorem royalties, with either variable rates or tiered royalty rates based on value, are now applied to most Queensland resources. Royalties structured in this way ensure that Queenslanders receive a larger share of the value of the resource as its value increases (similar to a profit sharing royalty, but simpler and not as volatile).

The chart below illustrates how a tiered (marginal) royalty rate translates into an average royalty rate at various price points for the Queensland coal royalty regime.

Chart 9.1 Marginal and average royalty rates for Queensland coal



Contribution and composition of Queensland's royalties

In 2012-13, royalties are estimated to contribute approximately \$2.3 billion, or over 5 per cent of Queensland's total revenue making them an important, albeit volatile, source of revenue. Currently, coal royalties represent approximately 80 per cent of total royalties, although this is expected to reduce slightly as LNG production increases.

Chart 9.2 2012-13 royalties (%)

Source - Queensland 2012-13 Mid Year Fiscal and Economic Review

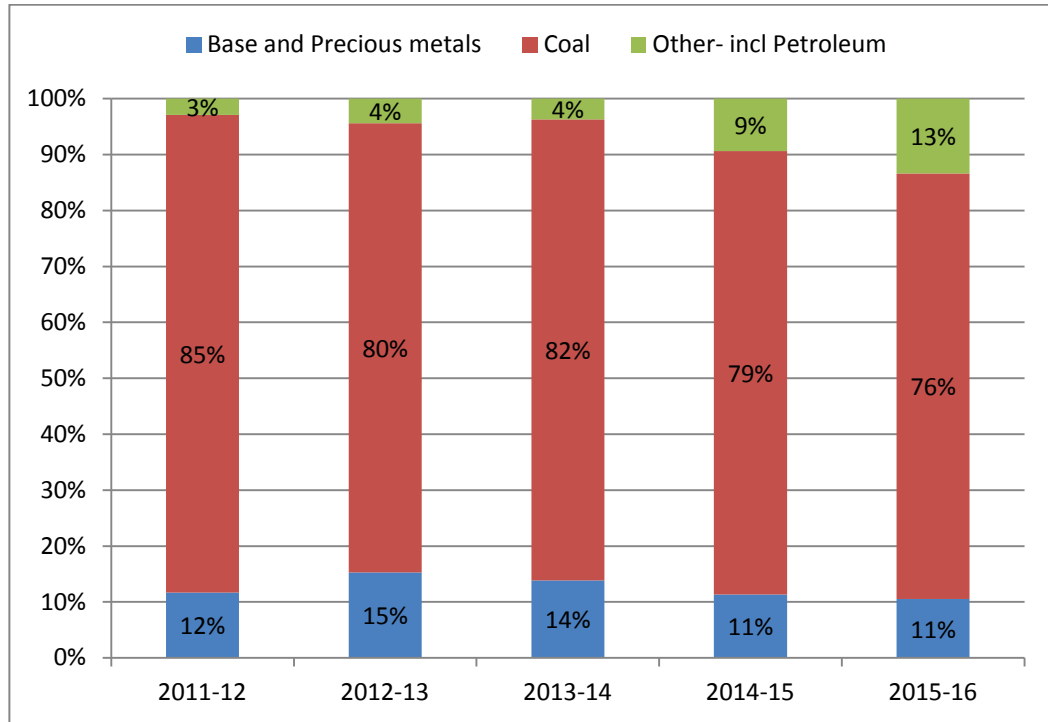
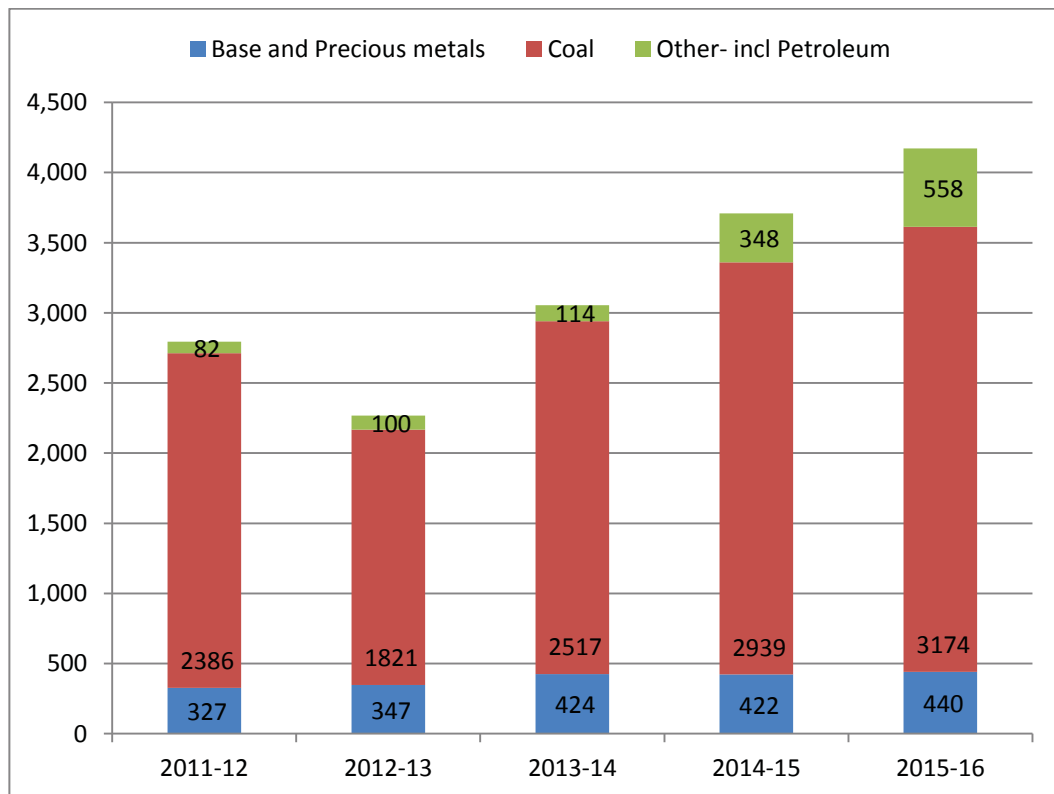


Chart 9.3 – 2012-13 royalties (\$M)

Source - Queensland 2012-13 Mid Year Fiscal and Economic Review



Currently, uranium would fall under the 'other mineral' category in Table 9.1 and be charged at a rate of 2.5 per cent of value. This is a 'catch all' rate which reflects the fact that uranium is not currently mined in Queensland (previously there has been no need to have a specific royalty rate for uranium). Conversely, Australian states and territories that permit the mining of uranium have specific rates for uranium, which are currently higher than the Queensland 'catch all' rate.

Even when the industry is fully developed, it is expected that royalties from uranium will be a small proportion of the total royalties collected by the state. Information on royalties attributable to uranium mining is difficult to identify but it is estimated that South Australia received approximately \$15 million from uranium royalties in 2011-12. It is unlikely that Queensland would reach a similar level of exports in the short-term, indicating that royalties received in Queensland would be lower. This would obviously be exacerbated if a concessional rate was made available to new mines.

However, the additional economic benefits in terms of economic and employment growth, combined with payroll tax impacts may be more significant.

9.3 Royalty regimes in other jurisdictions

State and territory uranium royalty rates

Given the relatively advanced uranium industries in South Australia and the Northern Territory, there are likely to be lessons learned from their uranium royalty regimes. The current (and proposed) rates of uranium royalties in other Australian states and territories are outlined below.

Table 9.2 Comparison of uranium royalty rates in Australia

Jurisdiction	Rate	Calculation of base	2011-12 royalties
South Australia ¹	5% of value	Market value (excluding GST) at the time the minerals leave the tenure, less: <ul style="list-style-type: none"> costs (including GST) to point of sale (including packaging, storage, loading, permit, fees and insurance costs) shipping costs to 'arms length' purchaser any other costs prescribed (section 8 <i>Mining Regulations 2011</i>). 	~\$15M
Northern Territory ²	Ranger mine: 5.5% of net sales. Future mines:	Net value is broadly equivalent to gross realisation (gross value of sales), less: <ul style="list-style-type: none"> operating costs 	~ \$13M, noting that this is notionally collected by the Australian

	20% of net value of saleable mineral commodities sold or removed without sale.	(reasonable expenditure directly attributable to production, maintenance for production, or marketing) <ul style="list-style-type: none"> • capital recognition deduction • eligible exploration expenditure • additional deduction. 	Government and then distributed to the Northern Territory Government (1.25%) and Indigenous land owners (4.25%).
Western Australia	5% of royalty value	Gross invoice value (quantity of mineral multiplied by price), less: <ul style="list-style-type: none"> • allowable deductions (reasonable costs incurred in transporting mineral after shipment date, and costs of packaging materials - section 85 <i>Mining Regulations 1981</i>). 	n/a

¹ Estimate provided by South Australian Treasury.

² Northern Territory 2012-13 Budget Paper.

International uranium royalty rates

A summary of the royalty rates and approaches in other international jurisdictions is shown in Table 9.3.

Table 9.3 Comparison of international uranium royalty rates

Jurisdiction	Rate	Calculation of base
Saskatchewan (Canada) ¹	Basic royalty (5%) plus Tiered royalty (6-15%) less Resource Credit (1%).	Basic royalty is 5% of sales value. Tiered royalty is 6-15% of sales depending on uranium price as follows: <ul style="list-style-type: none"> • <\$30=0% • \$30-\$45=6 • \$45-\$60=10% • >\$60=15%. Saskatchewan resource credit is 1% of gross sales.
Texas (USA) ²	6.25% to 18.25%	Rosita Mine royalty percentages on average increase from 6.25% up to 18.25% when uranium prices reach \$80 per pound. Vasquez mine royalty percentages 6.25% of sales below \$25 per pound

		and a sliding scale up to 10.25% above \$40 per pound. Kingsville Dome 6.25% of uranium sales.
Tanzania ³	5.0%	Based on gross profits rather than the previous which was built on net values.
Niger ⁴	5.5%	The 5.5% reflects the mining royalty when the operating income is less than 20% of the export value. Higher rates apply when operating income is more than 20% of export value.
South Africa ⁵	Variable	The formula for uranium is: $0.5 + [\text{EBIT}/\text{gross sales} \times 12.5] \times 100$ The royalties are 1.75% of gross sales when profits are 10% of gross sales.

¹ <http://www.er.gov.sk.ca/Default.aspx?DN=892618b1-2ba2-444d-b33e-97c1b5dcb6a0>

² <http://www.uraniumresources.com/category/project-state/texas>

³ <http://resourceinvestingnews.com/37414-tanzania-increases-uranium-mining-royalties.html>

⁴ <http://www.nirs.org/uranium/radrevenues.pdf>

⁵ <http://www.nirs.org/uranium/radrevenues.pdf>

Although a key objective is to ensure Queensland's uranium royalty regime is competitive with other Australian jurisdictions, there may be aspects of some international regimes that warrant investigation. In particular, Saskatchewan in Canada and some mines in Texas incorporate rate structures that increase as the price of uranium increases. This type of rate structure is based on the notion that, all other things being equal, higher prices result in a higher return on the extraction of the mineral, which should be shared between the producer and the state.

Determination of royalty value

Queensland currently does not have a specific royalty rate for uranium, therefore in the absence of a separate determination by the Queensland Government, the rate for 'other minerals' (a material for which a royalty rate is not already prescribed in the regulations) would apply. The royalty rate for 'other minerals' is 2.5 per cent of the value of the mineral.

Although the royalty rate and model chosen are important, the key issue to ensure that the uranium industry compensates Queenslanders for exploiting the resource is defining a fair measure of royalty value. As shown previously, other Australian jurisdictions use different measures of value and allow a wide range of expenses to be deducted before determining royalty value.

The South Australian and Western Australian models of restricting deductions to transport and packaging costs appear the simplest and result in the largest base to levy the royalty on, while still allowing some form of deduction to producers.

A model similar to the Northern Territory, where operating costs are deductible, is not recommended as it increases complexity in defining operating costs and may result in significant erosion of the revenue base.

A 'gross value' basis for calculating royalties with limited deductions (port, shipping, insurance and perhaps packaging costs) and no processing discount, may be an appropriate model for Queensland.

This would be broadly consistent with the existing Queensland model for base and precious metals, such as gold, and is more certain than the South Australian model, which has a broader range of deductions. The Northern Territory model allows operating costs to be deducted from the gross value, resulting in the requirement to impose a much higher royalty rate.

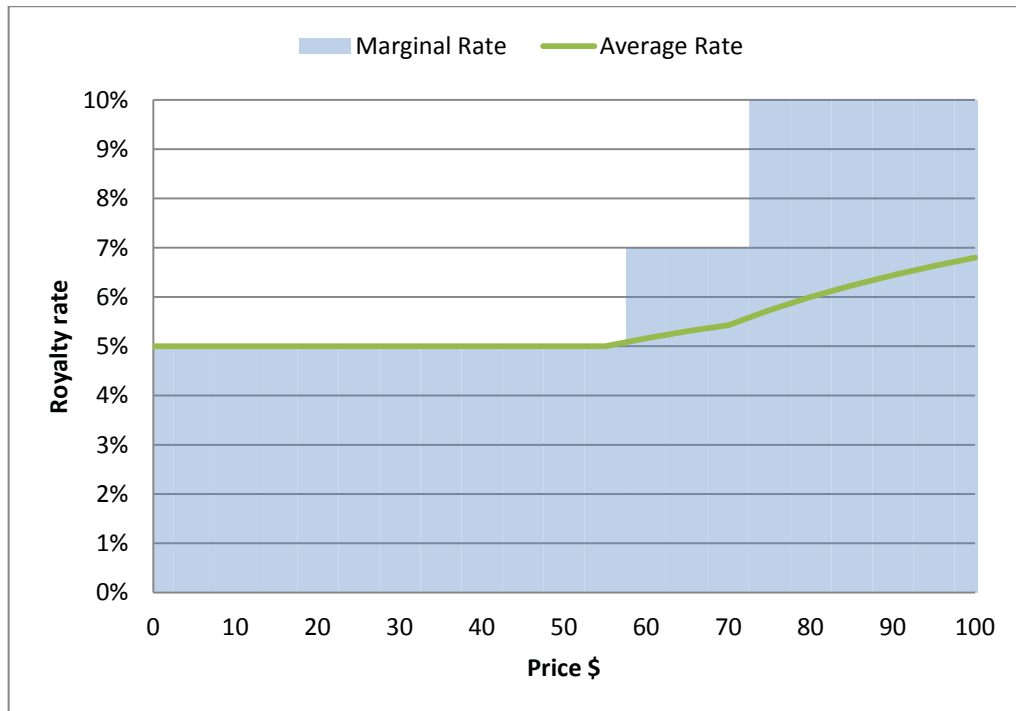
Indicative comparison

It is difficult to determine which of the models and rates would be the most appropriate, as the royalties collected are largely dependent on factors that are largely unknown. The claimable deductions in each state are not publically available information and though there is historic data on volume of exports and uranium price, it is difficult to predict the level of Queensland's exports and realised price.

On this basis, Queensland Treasury and Trade (QTT) developed a simplified model for the Committee which compares the three approaches using constant inputs for price and volume and assumed levels of deductions. Table 9.4 compares the royalties collected using these stylised representations of the South Australian model, the Northern Territory model and a tiered royalty structure.

The tiered royalty structure has an increasing marginal rate scale based on the price of uranium, similar to Queensland's coal royalty regime. When the price is below \$55 per pound the royalty rate is 5 per cent, from \$55 to \$70 per pound is 7 per cent and over \$70 per pound is 10 per cent, as represented in Chart 9.4.

Chart 9.4 Marginal and average royalty rates for a tiered royalty



The uranium spot price was approximately US\$43 per pound in the first week of 2013 and the results of a recent Bloomberg News analyst survey show that the spot price for uranium will average approximately US\$55 per pound this year. According to a number of industry experts the price needs to be in the vicinity of US\$70 per pound to make most major American operations economical.

The following tables are designed to illustrate how different types of royalty regimes respond to changes in price. They should be considered indicative only as an example of the type of regime, rather than attempting to replicate precisely how each of the regimes work. A number of assumptions have been made, including that the Australian Dollar and US Dollar are at parity and that costs (deductions) are independent of prices.

These tables show that the Northern Territory model is most responsive to changes in price, while the South Australian model is least responsive. The tiered approach sits between the two models as it is more responsive to price than the South Australian model, but not as volatile as the Northern Territory model. It is important to note that there are a range of prices (in this scenario, any price of \$45 per pound or less) at which no royalty would be collected under the Northern Territory model.

Table 9.4 - Royalties collected under different approaches as price increases

(\$'000 for illustrative purposes only)

When price is \$55

	SA Model	NT Model	Tiered ¹
Price	55	55	55
Volume	1,000	1,000	1,000
Gross export value	55,000	55,000	55,000
Deductions ²	10,000	45,000	5,000
Value for royalty purposes	45,000	10,000	50,000
Average royalty rate	5%	20%	5%
Royalty payable	2,250	2,000	2,500

¹ An indicative tiered royalty rate structure related to sales price. Similar to current coal model in QLD.² Indicative only.

When price is \$70

	SA Model	NT Model	Tiered
Price	70	70	70
Volume	1,000	1,000	1,000
Gross export value	70,000	70,000	70,000
Deductions	10,000	45,000	5,000
Value for royalty purposes	60,000	25,000	65,000
Average royalty rate	5%	20%	5.43%
Royalty payable	3,000	5,000	3,530
Change in royalty payable	750	3,000	1,030

Consideration of a concessional rate for new mines

In their submission, the Queensland Resources Council (QRC) recommended either the default 2.5 per cent rate that would be applicable to uranium, or a concessional rate be made available for mines in their 'early years'.

QTT provided advice to the Committee suggesting that in their view no allowance should be made for new mines in the royalty rate provided. However, there may be scope to provide regulatory assistance to new mines through the Resources Cabinet Committee process or, if royalty relief is preferred, by having a royalty free threshold, such as the \$100,000 threshold currently in place for base and precious minerals and other minerals.

QTT also identified possible difficulties in determining what constitutes a 'new mine' and whether an operation may relocate within an existing mine to receive the benefit of the lower rate.

9.4 Appropriate, clear and stable royalty regime for uranium extraction in Queensland

When deciding on the appropriate royalty regime to apply to uranium in Queensland it is important to be guided by some key principles such as efficiency, equity and simplicity.

A 'fair' royalty is one in which the return to the community is maximised, without discouraging the extraction of the resource. In Australia, it is considered that most royalty rates are intentionally low, as part of a policy to support industry development, employment and economic growth (noting that most of the additional revenue raised from this growth flows to the Australian Government, via company tax and income tax).

There is no simple calculation available to determine a fair royalty. Consideration must be given to the royalties applied to other resources and, in some cases, the interstate royalty rates applicable. In the case of uranium, it is expected that the starting point would be the comparable rates in other Australian jurisdictions, with consideration then given to any differing characteristics that indicate the rate should be set either higher or lower.

Profit based model

Profit based royalties and marginal royalty rates are considered to be the fairest, as the rate of royalty applicable varies depending on either the profitability of the operation (profit sharing) or the market value of the resource (marginal royalty rate).

However, profit based schemes often involve there being nil, or very low, royalties payable until the operation has recovered its development costs. Once these sunk costs have been recovered and a reasonably large proportion of the revenues are accounting profit, then the royalty rate increases dramatically. There are additional concerns with applying a profit based scheme including:

- difficulty in applying them to existing operations
- difficulty in determining which costs should be taken into account (i.e. exploration costs, financing costs)
- difficulty in calculating the operation's profits, particularly if they are part of a larger corporation or involved in related party transactions
- no royalty would be payable when operations were not profitable, despite the removal of the finite resource from the state.

Value based

Marginal royalty rates, based on value, are now applied to most Queensland resources. Royalties structured in this way ensure that Queenslanders receive a larger share of the value of the resource as its value increases (similar to a profit sharing royalty, but not as volatile).

Marginal royalty rates overcome a number of the problems associated with a profit sharing royalty as they can be applied to existing operations and are based on sales revenue, rather than profits, which are more easily manipulated. They also set a minimum royalty rate, to ensure that the state receives some benefit whenever resources are extracted, while under a profit sharing scheme the state only receives payments when the operation makes a profit.

Marginal royalty rates are also more predictable than profit sharing schemes, as the royalty rate applicable will usually be within a relatively narrow band. For practical reasons, such as alignment with existing royalties, revenue stability and simpler administration, the preference is for marginal royalty rates.

9.5 Cost recovery mechanisms

Fees and charges principles

The general principles for fees and charges reflect commonly accepted public sector management and governance concepts, and are applicable to all fees and charges, regardless of their nature:

- clarity of purpose
- transparency
- efficiency
- timeliness
- beneficiary pays
- minimise cross-subsidisation.

A regulatory fee is defined as a fee that is charged to recover the costs of providing a regulatory service for the broader public good, rather than primarily providing a direct benefit to the payee e.g. environmental licence fees that fund monitoring and inspection services, or fees associated with planning approvals. Generally speaking, there is no direct ‘beneficiary pays’ relationship for regulatory fees and charges, although there may be indirect benefits provided as a result of government undertaking the regulatory services, such as increased biosecurity.

In establishing and maintaining appropriate levels of regulatory fees and charges, the Queensland Government must ensure that the level reflects current government policy, and is in line with the provisions of the *Charter of Fiscal Responsibility*¹, which states: “The Government will maintain a competitive tax environment for business”.

In determining the most effective charging structure for regulatory fees, the Queensland Government must also consider any objectives (other than the objective of raising revenue) that it seeks to achieve within the community through the imposition of the fee. For example, is there a particular behaviour that government is seeking to promote in relation to the activity? Usually fines and penalties are imposed to regulate

¹ Refer <http://www.treasury.qld.gov.au/office/knowledge/docs/charter-of-fiscal-responsibility/index.shtml>

behaviour. Agencies must have regard to the cost of administering the penalty system and government policy objective.

Regulatory fees and charges for uranium mining

In addition to payment of royalties, the Committee recommends that the uranium mining industry face the usual cost recovery mechanisms that are applied to other mines in Queensland, including tenure and EA application fees, rent and the safety and health levy. Consistent with the overall findings that uranium mining should proceed largely within the existing approvals framework for other resource projects, the Committee does not see a need for a standalone schedule of fees to apply specifically to uranium mining.

However, regulatory agencies should have flexibility as part of their usual periodic review of fees and charges to consider more appropriate uranium specific cost recovery methodologies if a more accurate or efficient reflection of government regulatory cost can be shown. The Department of Environment and Heritage Protection (EHP) provided evidence of one such case (detailed below) which the Committee supports and recommends.

Under current legislation, and on the basis of using the usual cost recovery mechanism for the uranium industry, the regulatory fees and charges applying to uranium exploration, mining, transport and other regulatory functions are outlined in the various tables below.

Department of Natural Resources and Mines (DNRM)

The cost structure under the *Mineral Resources Act 1989* (MR Act) at a fundamental level is quite basic. Complexities arise in certain circumstances as discounts are applicable to the various mining tenements – for example a sliding scale of concessions applies to a mineral development licence (MDL) according to land area (hectares) subject to the MDL. In essence, rent is on a ‘per sub-block’ basis and the amount varies for each tenure holder depending on the size of tenure. Table 9.5 summarises the resource activities, permit fees and rents relevant to uranium mining and administered under the MR Act.

Broadly speaking, tenure rental can be described as a payment to the state for the right to have exclusive access to land for the purposes of exploring or producing minerals, petroleum or geothermal energy.

DNRM advised the Committee that their assessment and administration of tenure for uranium would be treated in the same manner as other minerals. The current rental structure reflects issues relevant to exclusive access as opposed to rents based on mineral types. Based on the purpose of rents, this is considered appropriate and does not warrant changes specific to uranium. The costs associated with gaining exclusive rights should not vary depending on the mineral being mined or explored.

Coordinator-General

As previously explained, the Committee is recommending that all uranium mine proposals proceed via the 'coordinated projects' process of the Coordinator-General under the *State Development and Public Works Organisation Act 1971* (SDPWO Act) to ensure a rigorous and comprehensive environmental impact assessment (EIA) and whole-of-government coordination.

Proponents of 'coordinated projects' that require an environmental impact statement (EIS) must pay fees as outlined in Schedule 1B of the State Development and Public Works Organisation Regulation 2010.

The fees cover some of the government costs of reviewing and administering the environmental coordination process of declared projects and the EIS process. The fees are paid up front, prior to the relevant milestone of the EIS process. In addition to these fees, proponents also pay the costs associated with public notifications during the relevant stages of the EIS process and the cost of independent studies or reports the Coordinator-General commissions to examine a specific aspect of a project.

Table 9.6 summarises mining project fees for projects declared 'coordinated projects' under the SDPWO Act. A detailed fees guideline is available to view on the Department of State Development, Infrastructure and Planning (DSDIP) website: <http://www.dlg.qld.gov.au/resources/guideline/cg/guideline-fees.pdf>.

DSDIP advised the Committee that there is currently no obvious need to have a separate fee schedule for uranium. A significant project that includes a mine, as well as rail and port components, attracts the same fees as a significant project that only includes a mine.

The current fees were derived from an estimate of time and effort for a 'typical' project assessment averaged over a range of project types. There is currently a fee review underway to update the estimates based on better data and coming reforms. DSDIP could consider the merits of a future sliding scale of fees depending on complexity of assessment.

Department of Environment and Heritage Protection (EHP)

EHP makes decisions about activities which pose significant environmental risks and may require multiple licences or permits. Mining activities that are part of a mining project are authorised under an EA. For a new mining project an applicant must apply concurrently for an EA under the *Environmental Protection Act 1994* (EP Act) and a mining tenement under the MR Act, both with associated fees and charges.

The EP Act's EIA process, and its associated fees and charges, would not apply to uranium mining proposals which are declared a 'coordinated project' under the Coordinator-General process (SDPWO Act) as per the Committee's recommendation in this report. In this case the fees and charges outlined under the Coordinator-General process will apply instead. However, it is worth briefly outlining the EP Act fees and

charges. Table 9.7 summarises the relevant environmental protection licence fees administered under the EP Act.

Currently, Schedule 6 of the Environmental Protection Regulation 2008 (EP Reg) sets the fees for site specific mining activities. In this schedule, fees are set for various metalliferous (and related) mines including bauxite, mineral sand, iron, nickel, gold, copper, lead, silver and zinc. The fees for these are based on what is called an Aggregate Environmental Score (AES) which ranges (for each of these activities) from 97 (bauxite) to 217 (copper).

There is currently no AES for uranium, however there is an item for mining metal ore other than a metal ore mentioned above (this has an AES of 158). There is also an AES for milling which is 179 (100 tonnes up to 100,000 tonnes of product per year) or 280 (over 100,000 tonnes of product per year). There is unlikely to be any uranium mine which has this level of output (as an example, Beverly typically has 800 tonnes of product per year).

The *Environmental Emission Profiles* (EPA, 2008) document provides calculations of AES scores. This document was written in the absence of a uranium mining industry and therefore did not calculate an AES for uranium mining specifically (and has not considered radionuclides). EHP advised the Committee that *Environmental Emission Profiles* is due to be reviewed this year, and that the department could consider including uranium in the review as it related to an AES score. The Committee supports this approach.

Queensland Health

As discussed earlier, Queensland Health's Radiation Health Unit (Radiation Health) is responsible for establishing the radiation safety and hygiene, security and control standards for the state and is responsible for the monitoring, surveillance and enforcement of these standards and for the immediate and consequence management of radiation related incidents.

Radiation Health manages a statewide program and, among other things, is responsible for administering the *Radiation Safety Act 1999* (RS Act) including considering and deciding applications for licences, certificates and approvals made under the RS Act. The object of the RS Act is to protect people and the environment from the harmful effects of particular sources of ionising radiation and harmful non-ionising radiation². Radiation Health also provides specialist advice to emergency service providers in radiological emergencies and assesses land contaminated with radioactive material, recommending to EHP whether such land should be listed on the environmental management or contaminated land registers.

² Note that the health and safety issues arising from exposure to radioactive minerals (including uranium ore and other Naturally Occurring Radioactive Materials - NORM) are dealt with through the *Mining and Quarrying Safety and Health Act 1999* administered by the DNRM.

The costs related to regulation of uranium mining under the RS Act mainly relate to possession licences for the processing of uranium (if done outside a mining lease), and to licences for the transport of uranium. Table 9.8 summarises the possession and transport licence fees administered under the RS Act.

Queensland Health estimates that, for example, the income from fees charged for a single processing plant (if done outside a mining lease) with one radiation safety officer would be: \$737 in the first year, and \$363 in subsequent years. The estimated actual costs are estimated at:

- \$3000 initial (labour) cost of assessment of licence applications and safety plans
- \$2500 annual (labour) cost of two inspectors conducting one inspection per year to access compliance of processing and transport operations
- \$2500 annual (non-labour) cost of the above inspection.

Additional costs would be incurred if Radiation Health were to assist in the inspections carried out by DNRM and EHP.

Table 9.5 Resource activities permit fees and rents administered under the MR Act

Activity tenure permits	Fee type	Costs
Exploration permit	Application for minerals other than coal exploration permit	\$799
	Exploration renewal permit	\$533
MDL	Application for grant of minerals other than coal for MDL	\$2132
	Mineral development renewal permit	\$746
Mining lease	Application for grant of, or renewal of, mining lease for other minerals	\$1332
Rent payable (annual)		
Exploration permit	For each sub-block to which the exploration permit applies	\$131.40
MDL	For the first year of the licence	\$3.75
	For the second year of the licence	\$7.60
	For the third year of the licence	\$11.55
	For the fourth year of the licence	\$19.90
	For a year of the licence after the fourth year	\$23.90
Mining lease	For each hectare to which the mining lease relates	\$50.75

Table 9.6 Mining project fees for declared 'coordinated projects' (SDPWO Act)

Application type		Cost (annually)
Coordinated project declaration and EIS process	Application for declaration of significant project	\$28,037
	Notice of requirement for EIS and of draft TOR and finalising TOR	\$27,027
	The matters mentioned in S31, 32 and 33(1) relating to an EIS	\$54,053
	Coordinator-General's evaluation of EIS, submissions, other material and preparation of report	\$54,053
Evaluation of changes to significant project	Application for evaluation of environmental effects of proposed change	\$1071
	The matter mentioned in section 35F to 35J if the Coordinator-General decides under S35G not to require public notification and the decision notice under S35G does not accompany the Coordinator-General's change report	\$27,027
	The matters mentioned in S35F to 35G if the Coordinator-General decides under S35G to require public notification	\$54,053

Table 9.7 Environmental protection licence fees under the EP Act¹

Tenure type	Fee Type	Amount
EIS ²	Terms of Reference (TOR)	\$32,167
	EIS assessment	\$96,503
	Amendment	\$10,722
	Application to prepare voluntary EIS	\$551
Exploration permit (mineral)	Application fee	\$551 plus annual licence fee
	Annual fee (standard or variation application only)	\$551
	Annual fee (site specific application only)	\$1766.40
MDL	Application fee	\$551 plus annual licence fee
	Annual fee (standard or variation application only)	\$551
	Annual fee (site specific application only)	\$3,753.60
Mining lease (metal ore, other than bauxite, mineral sand, iron, nickel, gold, copper, lead, silver or zinc) ³	Application fee	\$551 plus annual licence fee
	Annual fee (site specific application only)	\$34,886.40

¹ The fees in this table assume that no other activity under the EP Act is being conducted as part of the uranium mining project e.g. Prescribed ERA 31 – Mineral Processing (see Schedule 2 of *Environmental Protection Regulation 1998* (EP Regulation) or the mining of another metalliferous ore). Where more than one activity is being conducted as part of a mining project, the annual fee will be the highest of the applicable annual licence fees.

² The EP Act EIS process will not apply to projects which have been declared a coordinated project under the SDPWO Act.

³ Uranium would currently be assessed under this general metal ore category. There is currently no annual fee specific to uranium mining under Schedule 6 of the EP Regulation. The committee supports EHP considering a specific item be included in Schedule 6 of the EP Regulation for uranium mining, and notes that a review of the 'Environmental Emission Profiles' document could be the mechanism for this. For the purpose of this table it is assumed that an EA for a uranium mine will require a site specific application.

Table 9.8 Possession and transport licence fees under the RS Act

Possession of a radioactive substance		Cost
Possession licence	Initial application fee for a possession licence	\$385
	Ongoing annual possession licence fee	\$220
	Ongoing annual fee for possession for each type of unsealed radioactive substance	\$88
Radiation safety officer certificate	Initial application fee for an RSO certificate	\$77
	Ongoing annual RSO certificate fee	\$55
Transport of a radioactive substance		Cost
Transport licence	Initial application fee	\$77
	On-going annual licence fee	\$55

¹The *Radiation Safety Act 1999* does not apply to minerals (within the meaning of the *Mineral Resources Act 1989*) situated on land the subject of a mining lease, mineral development licence, or exploration permit. Since it is expected that uranium processing activities would take place on such land, it is unlikely that the fees related to possession of a radioactive substance will apply. The fees related to transport of uranium ore concentrate will apply.

10. Conclusions and way forward

10.1 Committee remarks and conclusions

The Committee found that the Queensland Government's decision to allow the recommencement of uranium mining in Queensland effectively brings this state's policy into line with long established, bi-partisan national policies. Many of the environmental and radiation safety issues associated with uranium mining are also dealt with in other existing mining activities. The Committee concludes that Queensland's existing framework for the regulation of mining and radiation safety is appropriate for the recommencement of uranium mining.

However, while a new legislative framework is not required, the Committee has made recommendations on how to adapt the existing framework to ensure it meets best practice. The central recommendations relate to:

- Developing new institutional arrangements that improve the coordination of assessment and approvals for uranium mines
- ensuring optimal cooperation between regulatory agencies
- improving engagement with stakeholders
- establishing a funded initiative to assist Indigenous people to access the benefits from uranium mining and the resources industry.

The Committee believes that implementing the following key actions will provide Queensland with the best possible tools and mechanisms for a successful, sustainable and responsible uranium mining industry:

- coordinating approvals process for uranium mining by referring all proposals to the Coordinator-General's 'coordinated project' process (this policy should be reviewed after an initial period)
- assessing uranium mines for the purposes of the *Environment Protection and Biodiversity Conservation Act 1999* be undertaken according to the bilateral agreement between the Queensland and Australian Governments
- establishing a whole-of-government Uranium Mining Oversight Committee (UMOC) to oversee uranium mining implementation, operation and rehabilitation
- using an independent 'specialist advisor' such as the Australian Government's Supervising Scientist Division, which has expertise in managing environmental performance of uranium mining and compliance and performance audits
- establishing a Uranium Mining Stakeholder Committee that is supported by the UMOC to represent local governments and communities, Indigenous groups, industry, environmental and natural resource management groups
- pursuing the establishment of an inter-state committee to oversee and harmonise transport and logistics associated with uranium, including mutual recognition of transport licences
- facilitating the use of existing ports (Darwin and Adelaide) and shipping lanes for uranium export
- developing a Memorandum of Understanding (MOU) between Queensland's transport regulators regarding transport compliance inspections

- establishing a new MOU between relevant regulating agencies (including reviews of existing MOUs) to ensure clear roles and responsibilities, and foster cooperation and collaboration on sharing expertise
- developing specific mine safety and health guidance documentation to ensure best standards are maintained at all stages of uranium exploration, mining and ore milling and processing
- ensuring radiation safety regulators develop and implement guiding principles for emergency response, and conduct education and training for emergency workers
- developing environmental model conditions specific to uranium mining focused on achieving positive environmental outcomes rather than prescriptive measures
- reviewing rehabilitation guidance material with particular consideration to the need for rehabilitation goals, objectives and completion criteria specific to uranium mining
- using third party auditors to augment Queensland's in-house regulator expertise
- extending the Royalties for Regions program to future uranium mining areas
- implementing a mining training and business development initiative to assist Indigenous people to access the benefits from uranium mining, in the form of a trust arrangement with a state funding contribution
- applying a five per cent royalty regime to uranium, but also investigating use of a higher rate once the price of uranium reaches a certain higher threshold
- offering a 'new mine' concessional rate of 2.5 per cent for the first five years of a mine's life.

10.2 Implementing the report's recommendations

The Committee believes that immediate responsibility for coordinating whole-of-government action on implementing recommendations from this report should be devolved to the Department of Natural Resources and Mines (DNRM). One of the first actions should be to establish the UMOC, to be chaired by the Director-General of DNRM.

10.3 The future

There is much anticipation about when the first uranium mine could commence in Queensland. Already, there are numerous expressions of interest from industry participants with the potential to establish viable mining operations in Queensland.

The likely timeframe for uranium production in Queensland is ultimately a matter for proponents. The commencement of the approvals process for a uranium mine will be determined by individual project proponents. Once the approvals process has commenced, there are a number of variables that may affect when a mine commences operations. These variables include the proposed mine's location and its surrounding environment and geology, consultation with community and stakeholders and the likely duration of the construction phase of the mine.

A significant factor determining the timing of any new uranium mining project in Queensland is the economic context at the time, market conditions and outlook. Closely linked to these is the ability of a company to raise capital to finance new mining developments. Current uranium spot prices of between US\$40–\$50 per pound are well below what are considered by industry and analysts to be 'economic' price levels, that is,

in the order of US\$70–US\$80 per pound. While current prices are subdued, and there is a level of uncertainty in the immediate future, it is generally accepted that the longer term outlook points to an emerging supply deficit and growth in the industry.

A development that may change the economic outlook for Australia and Queensland is the progress of negotiations on a safeguards agreement with India, as a precursor to selling Australian uranium to India solely for peaceful purposes.

In areas like Mary Kathleen, uranium was present in tailings along with other minerals. This gives rise to the potential for uranium oxide to be produced as a co-product, which may lead to a quicker start for the industry. A stand alone mine may take several years to get to the production stage.

Advice to the Committee suggests broad timeframes of between four and seven years for a uranium mining proposal to become operational in Australia. As all uranium mines must be approved by the Australian Government, the time taken for that process is one variable the state has limited control over. Taking Western Australia as an example, the lifting of the ban on uranium mining was announced in 2008. The first proposed mine that is undergoing the approvals process, Toro Energy's Wiluna Uranium Project, lodged its final environmental impact statement in December 2011. In October 2012, the Wiluna Uranium Project was granted state environmental approval. The project is now awaiting approval at the national level.

10.4 Mary Kathleen tender process

As discussed in Chapter 7, the Committee notes the commitment by the Honourable Andrew Cripps MP, Minister for Natural Resources and Mines, to investigate the redevelopment of Mary Kathleen for rare earths subject to assessment of site safety and environmental issues. While the resources at Mary Kathleen had been exhausted commercially based on the previous uranium only operation, it is likely that it will be more viable when mined with these other minerals such as rare earths.

The Committee believes this investigation provides an opportunity to also examine further uranium mining activities as a byproduct of rare earths production via a tender process, and possibly serving as a catalyst for the development of the uranium mining industry in Queensland. Further rehabilitation requirements over the site should also be investigated as part of any tender process.

Terms of Reference

Implementation Committee

To advise on the recommencement of Uranium Mining in Queensland

The Implementation Committee is asked to report to Government recommending a best practice policy framework for the orderly development and operation of a recommenced uranium mining and export industry in Queensland. The framework should ensure that uranium mining recommences with world best practice environmental and safety standards, whilst creating an attractive environment for investment.

The Committee has been asked to report to Government by Monday 18 March 2013.

As part of its investigation, the Committee should consider:

- The context of uranium mining as currently permitted across other jurisdictions in Australia.
- The appropriate role of the State Government in regulating the mining of uranium having regard to Queensland's mining legislation and regulation framework and the role of the Federal Government.
- Creating real jobs and opening up real opportunities for Indigenous employment and training, including partnerships with industry.
- Regional and community development opportunities including job creation and appropriate social impact management plans.
- Safety and logistics issues associated with the mining, transport and export of uranium from Queensland.
- Workplace health and safety standards equal to the world's best.
- Ensuring the highest environmental safeguards and rehabilitation requirements.
- Infrastructure and security issues associated with the processing, transport and export of uranium mined in Queensland, with particular reference to the use of export facilities in Queensland or interstate.
- The appropriate royalty regime for the State.
- Any other matters the Committee deems relevant to implementing the Government's decision to recommence uranium mining in Queensland.

These terms of reference do not extend to the use of uranium as fuel for nuclear energy production in Queensland or for the disposal of nuclear waste produced by external customers of this material.



Uranium Mining Implementation Committee

Consultation submission analysis report

February 2013



Executive summary

This report presents findings from an independent review and analysis of submissions for the Uranium Mining Implementation Committee's request for stakeholder comment regarding uranium mining and the export industry in Queensland.

Thirty submissions were received from industry groups, research bodies, local governments, Commonwealth Government departments, environment and conservation groups, ports and health bodies, a union and international companies with an interest in the uranium mining industry.

With the notable exception of environmental and conservation groups, stakeholders generally support the recommencement of uranium mining in Queensland.

The two issues of greatest concern are the rehabilitation and remediation of uranium mining sites, and the appropriate treatment of radioactive substances, both short and long-term.

Mining of uranium is considered to adopt similar processes, practices and therefore require similar approval and regulation processes to other types of mining activity, with the exception of the safe handling, storage and rehabilitation of radioactive substances.

The current regulatory regime for mining is considered to be satisfactory for uranium mining, with additional measures to address radiation.

Environmental groups expressed concerns about potential environmental damage, community risks from mining waste, handling and transport of uranium and concerns about the end use of uranium for energy and weapons.

Cost recovery mechanisms as they currently apply to other mining activities, for example tender and environmental authority application fees, rent and the safety and health levy should also apply to uranium mining.

Companies should demonstrate their capacity to adequately fund rehabilitation of mine sites and pay for environmental accidents, to ensure additional costs are not borne by taxpayers. Bank bonds should be considered and plans put in place from the outset to manage these risks.

Regional communities are expected to benefit from economic development and employment opportunities however policies are required to ensure that local businesses benefit.

The State Government should work with the Commonwealth Government and other states to streamline transport licence provisions, to ensure more efficient transporting of uranium by road and remove any inconsistencies.

The most likely export points for uranium mined in Queensland would be through existing Northern Territory or South Australian ports, however some Queensland ports may have the capacity and capability to be developed as uranium export facilities.

There are concerns about the nature of uranium mine tailings and the long-term cost of managing mine waste.

Whole-of-life-cycle planning is required to include a mine closure plan and ensure that long-term legacies and rehabilitation are planned for from the outset of the mining venture.

The State Government should take a proactive lead role in providing information and education about uranium mining and that consultation should be carried out with local communities.



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Introduction and background

This report presents findings from an independent review and analysis of submissions for the Uranium Mining Implementation Committee's (the Committee) request for stakeholder comment regarding uranium mining and the export industry in Queensland.

On October 22, 2012, the State Government announced the recommencement of uranium mining in Queensland. The Premier established the Committee to recommend a best practice policy framework for the orderly development and operation of a uranium mining and export industry in Queensland. The Committee operates under Terms of Reference established to guide its work.

In November 2012, the Committee wrote to a range of stakeholders inviting them to provide feedback to the Committee to assist it in its deliberations. The stakeholders covered industry, unions, the research community, environment and conservation groups, health bodies, government departments and transport bodies. Each stakeholder was provided with questions relating to the Terms of Reference to help guide their feedback.

In response to 72 stakeholders invited to make a submission, 30 submissions were received from a wide range of stakeholders. The feedback in these submissions reflects the targeted nature of the consultation and the views of the stakeholders who were selected.

One provided no specific feedback and the remaining 29 submissions were segmented into the following categories:

- industry (9 submissions)
- research community (5 submissions)
- local government (4 submissions)
- environment/conservation/natural resource management (4 submissions)
- transport (2 submissions)
- health (1 submissions)
- international (2 submissions)
- unions (1 submission)
- government (1 submission).

Industry groups that provided feedback included mining companies, relevant associations and industry councils. The research community was represented by universities, the Commonwealth Government and institutes and organisations relevant to the uranium industry. Local governments within areas where uranium deposits are located were keen to express their viewpoint as were environmental and conservation groups.

Other stakeholders included a Canadian mining association, a trade union, port corporations, health and safety bodies and a Commonwealth Government department.

Communication consultancy, The Comms Team, was appointed to undertake an independent review and analysis of the submissions. The Comms Team has significant experience in stakeholder consultation and the review and analysis of submissions for government projects and policy frameworks.

Refer Appendix A for a sample of the stakeholder letter.

Refer Appendix B for a full list of submitters.



Analysis methodology

Stakeholders were segmented into categories which reflected their interests. As part of the request for feedback, they were provided with questions relevant to their expertise and interest to help guide the type of feedback. For example, ports corporations were asked about the capacity of their facilities to export uranium and import plant and equipment, whereas local government was asked about matters such as land use planning and consultation processes.

The questions provided to stakeholders largely aligned with the Terms of Reference (with some minor exceptions). Therefore the analysis of submissions was undertaken using similar categories to the Terms of Reference.

A list of categories was developed for analysis based on the questions and the Terms of Reference. These categories are as follows:

- Context – detailing how uranium mining is currently permitted across other jurisdictions
- Regulation – the appropriate role of the State Government in regulating the industry
- Indigenous opportunities – investigation of opportunities for employment and training
- Community development – investigation of regional and community development opportunities
- Safety and logistics – safety and logistics in relation to mine sites and transport logistics issues
- Workplace health and safety – ensuring world’s best practice
- Environment – safeguards associated with mining, transport and exporting uranium
- Rehabilitation – requirements, standards and the use of appropriate financial assurances
- Infrastructure and security – issues associated with the exporting of uranium including associated infrastructure
- Best practice approvals – establishing best practice approvals processes
- Cost recovery – developing appropriate mechanisms for State Government regulatory activities
- Royalties – developing an appropriate royalty regime
- Target areas – areas of potential exploration and mining activities
- Other – including communication and consultation, planning, investment and community health.

Each submission was comprehensively reviewed and relevant feedback was identified. Each submission was then logged against these categories in an analysis spreadsheet to prepare a comprehensive data set by theme. This information can be sorted by submission category and stakeholder type.

For some categories, for example regulation, approvals, environment and rehabilitation – a large volume of feedback was received. In these cases, sub-headings have been used to sort, analyse and present information. Some submissions also included supporting information or reports.

Refer Appendix C for a log of supporting information.



Findings

The findings of the feedback have been arranged under the categories noted above. This represents a summary of the feedback received.

Context

The Committee was tasked to consider the context of uranium mining as permitted across other jurisdictions in Australia. Submissions covered what stakeholders saw as both the positive and the negative context of uranium mining in Australia.

Many submissions included broad information about the uranium mining industry both within Australia, and the expected scope and value of the prospective industry within Queensland. They stated that Australia has the world's largest known deposits of recoverable uranium and the largest reserves of any country. They noted that the four mines currently operating in Australia produce around 15-20 per cent of the world's uranium. Submissions provided information on the history of the industry in Australia, industry practices and mining techniques.

Submissions pointed out that uranium exploration, mining and exports are permitted by the Commonwealth and that the removal of the ban on uranium mining in Queensland brings it into line with national policy and the policy of most states and territories.

Several submissions, particularly those from industry, research bodies and local government, included broad statements in support of the recommencement of uranium mining in Queensland.

Submissions made by environmental groups noted historical problems or issues encountered in other Australian jurisdictions, particularly focused on meeting regulatory standards, rehabilitation, long-term impacts and the costs of addressing any environmental hazards.

Regulation

The UMIC was tasked with determining the appropriate role of the State Government in regulating the mining and export of uranium – having regard to Queensland's legislation and regulation framework and the role of the Federal Government.

A key theme across submissions is summed up by this comment:

"In every respect except one, the regulatory regime for the uranium industry should be no different from any other mining industry. The exception is that uranium is a radioactive substance. Therefore, even if the actual risks involved in uranium mining are generally no greater than those associated with other mining activities—particularly in Australia, where the grades of uranium mined are relatively low—the public perception is that the industry is more risky. A key objective of regulation must be to provide a level of comfort to the community as well as to manage the genuine risks." Noted by Deloitte in the Review of Regulatory Efficiency in Uranium Mining (2008) - Taken from submission by Australian Government Department of Resources, Energy and Tourism.

To help clarify the feedback received on this complex issue, analysis has focused on the strengths and weaknesses of the existing regulatory framework, recommendations and general information.



Strengths of existing regulatory frameworks

In general, submissions from industry bodies, the research community and local government state that they are satisfied that Queensland has the capability and expertise to administer the uranium mining industry within the existing framework. They do not believe that administering the uranium industry will require special or additional regulatory resources beyond what currently exists.

Submissions also commented that in practice, assessment and approval of uranium projects is a cooperative effort by the Commonwealth and State Governments, and that all exploration and mining projects require both a tenure from the Department of Natural Resources and Mines (DNRM) that gives conditional access to the land, and an environmental authority from the Department of Environment and Heritage Protection (DEHP) that regulates environmental management of the exploration and mining project.

Weaknesses of the existing regulatory frameworks

Environmental groups used their submissions to express their opposition to the decision to recommence uranium mining. Environmental groups also commented that the uranium sector is characterised by regulatory non-compliance and is in need of regulatory reform. They believe that greater emphasis is placed on short-term considerations rather than long-term needs and environmental protection. These groups also believe a dedicated public inquiry into the impacts and implications of uranium mining should be a pre-condition to the development of the uranium mining sector in Queensland.

Submissions from industry groups expressed concern that public pressure on governments to demonstrate that regulation is all-encompassing has resulted in policy decisions that have caused duplication and complication of the existing regulatory provisions.

A submission from local government also showed concern that proactive monitoring and policing of condition compliance does not continue once the approvals have been issued and mining has commenced, and believe that compliance self-assessment needs to be improved.

Recommendations for the regulatory framework

Submissions from all sectors provided recommendations for the Committee to consider regarding the best way to regulate the Queensland uranium mining industry. Industry recommendations are as follows:

- The need for a regulatory balance that recognises both community concerns and the need for rigorous appraisal and the value of the existing regulatory process to provide the opportunity for consultation and comment.
- Regulatory tools should specifically target and overcome aspects of uranium mining should market failures exist.
- One State Government agency should be chosen to liaise with Commonwealth authorities on uranium security issues.
- A radiation protection, safety and health regulator working group should be established to ensure definition of responsibilities, better collaboration and aligned procedures. A Memorandum of Understanding (MOU) could be established between the two regulators.
- A commitment by regulators, proponents and stakeholders to continual improvement in processes.
- A shared commitment to openness and consultation at all stages of the mining life-cycle.
- An emphasis on outcomes-based regulation, wherever possible and appropriate.



- Transparency and consistency in regulatory systems and in decision-making.
- Risk-based assessment and management of environmental, safety and social impacts.
- Regulation should be more outcome-based than prescriptive (with the exception in the uranium mining context being radiation exposure limits).
- All decision-making, mining lease conditions and performance assessments should be informed, science-based, ethical, transparent, and publicly available.
- Extend existing legislation that relates to radiation safety so that it has coverage in the uranium mining sector.
- The uranium industry should continue to be consulted in the development of any uranium-specific supplementary terms of reference for environmental impact statements, and any uranium model conditions for uranium mine environmental authorities.
- Industry and government should work together with project proponents to facilitate uranium projects in line with current practices applicable to the mining industry.

Recommendations from the research community for the best regulatory framework include:

- The uranium industry requires a regulatory framework that is robust, resilient, and that can engender widespread community confidence.
- Government should be transparent about its intentions and role as regulator of the industry.
- A specialist mining environmental assessment, rehabilitation and closure team should be established to oversee and manage the environmental regulatory system and ensure it aligns with international best practice.
- Uranium exploration and mining industry practices in South Australia and the Northern Territory are an appropriate basis for developing an adaptable regulatory framework for Queensland.
- Regulation should prescribe the standard that must be achieved rather than a method by which the outcome must be pursued; and require an outcome that reflects an understanding of the risks of the regulated activity.
- It would be highly desirable for Queensland to collaborate with the Commonwealth and relevant state and territory governments to achieve consistent, effective and efficient regulatory outcomes.

A submission from an environmental group call for the government to closely regulate uranium exploration and mining companies to ensure they do not promote an unsafe culture around radiation safety.

From a local government perspective, the framework for uranium mining in Queensland needs to provide quality and timely information relevant to a council's obligations as an infrastructure and service provider in a local community. The framework also needs to be flexible to local circumstances and allow the council the opportunity to influence development, in line with regional and local planning processes.

A submission from a Canadian company notes that, while Saskatchewan mining operations are world class, there are improvements that could be made to improve competitiveness, while maintaining environmental and safety performance. In Canada both the provincial and federal governments are involved in the regulation from construction through to de-commissioning and reclamation. The result is the system is less efficient than it could be, with regulatory overlap and duplication which leads to additional costs and delays to industry and government without any identified improvement in environment and safety performance.



Indigenous opportunities

The Committee was tasked to investigate the potential for the uranium industry to create jobs and opportunities for Indigenous employment and training, including partnerships with industry. Submissions covered these issues and also identified issues such as Native Title and Indigenous Land Use Agreements (ILUA).

The main theme emerging from all groups, except environment groups, is that the uranium industry offers significant employment opportunities for Indigenous people. The proximity of potential uranium mining sites to Indigenous communities in north-western Queensland is seen as a specific benefit to encourage Indigenous employment.

Submissions identified opportunities such as business and contracting and development activities; royalty payments; priority hiring of local people; direct employment targets; employee mentoring; and local employment registers.

Submissions from environmental and conservation groups took an alternative view, expressing concern that potential job opportunities are used as an incentive for communities to consent to uranium mining at the cost of long-term health and welfare.

These groups also believe that Indigenous communities should have the right of informed consent as an effective right of veto over uranium mining and be provided with a proper consultative process. They believe there should be no disadvantage to communities that reject proposed native title mining agreements.

Submissions from industry groups urged the government to engage comprehensively with Indigenous stakeholders to understand and respond to the social and environmental concerns of Indigenous people.

Submissions from local government bodies suggest that uranium mining will bring employment, training, and wealth generation assistance for Indigenous people as well as economic benefits.

Submissions from the research community pointed out that it is important to consider incorporating into future legislation the requirement for free, prior and informed consent (FPIC) before uranium (and other resource) developments are approved. Negotiation of ILUAs and Impact and Benefit Agreements between Indigenous groups, the State Government and other relevant stakeholders are encouraged.

A submission from the Commonwealth Government detailed the policies relevant to Native Title and ILUAs.

Community development

The Committee was charged with investigating regional and community development opportunities including job creation and addressing any social impacts.

Submissions from industry broadly stated the impacts and benefits felt by communities impacted by uranium mining were comparable with those associated with the mining of other mineral commodities. Benefits were seen to be improved economy and employment and impacts were housing affordability, fly-in-fly-out issues and associated social impacts.

It was accepted that these impacts would be considered through social impact assessment processes and that consultation with the community was essential to produce the best outcome.



A submission from the research community suggests that there are lessons to be learnt from the coal seam gas debate, and reiterates that government needs to engage with community and affected landholders on issues of local importance.

Environmental groups are concerned about the social issues that mining creates in communities in general and don't believe the industry will offer any real local job opportunities. They cite that it is highly unlikely that uranium mining in Queensland could create many real jobs for any sector of the community.

A submission from local government indicates that while the mines will bring economic and employment benefits, the availability and affordability of residential land and housing to support uranium mining in the north-west region is of concern.

Another submission from local government stated the importance of government policy in ensuring local businesses benefit from the reintroduction of the mining industry.

Safety and logistics

The Committee was asked to identify safety and logistics issues associated with the mining, transport and export of uranium from Queensland.

A number of submissions from the industry bodies called for the streamlining of the current transport license provisions to allow for more efficient transporting of uranium by road. They stated that it is important to dovetail license regulations with those in South Australia, the Northern Territory and the Commonwealth. The Queensland Government should work with the Commonwealth Government, other states and particularly the Northern Territory to streamline any inconsistencies that may exist between the transport requirements of each state. This is especially important if the uranium from Queensland mines is shipped from Adelaide or Darwin instead of a port in Queensland.

Submissions from some industry bodies called for a reform of transport regulation and licensing of uranium to provide for a single authority and single set of requirements. Another industry body suggested that the Committee consider the extent to which the current license and approval systems and regulations at state level overlap with the various Commonwealth requirements, before recommending that the state embark on any additional regulatory requirements.

Submissions from industry and transport bodies recognised the importance of communicating with local communities along potential transport routes, relevant local and State Governments and emergency services authorities to agree to the conditions under which the uranium is transported. It was stated that it was particularly important to consult with the relevant local government on the proposed transport routes for uranium and how traffic along those routes will be monitored. It is critical for councils to be appropriately informed about the transportation of uranium to support local government planning processes.

Submissions from environmental groups expressed concern about the safety issues associated with transporting the uranium by road and transport bodies wanted assurances that incident response action plans, detailing specific actions to be undertaken as a result of any incident, would be developed and carefully managed.

Uranium mine operators would be subject to Queensland and Commonwealth Government regulations as well as international protocols on safety and security.

Submissions from the research community suggested environmental safeguards for the transportation of uranium be reviewed to ensure they were appropriate for Queensland's environmental and climatic conditions.



Workplace health and safety

The UMIC was tasked with considering the implementation of workplace health and safety standards equal to the world's best.

Submissions addressing this aspect were received from industry groups and a union. Most industry submissions stated that Queensland already had in place appropriate standards and only minor adjustments needed to be made to the legislative framework to accommodate the specific issue of radiation exposure.

More specifically, submissions acknowledged that the existing provisions of the *Mining and Quarrying Safety and Health (MQSH) Act 1999* are appropriate to deal with uranium mining generally but that there may be a need for some detailed prescriptive requirements in relation to exposure limits.

Submissions from environment and conservation groups detailed concerns about the history of incidents within the uranium mining industry and the health impacts the industry has on employees in general. They also called for an independent and standardised radiation, health and safety training program for workers.

Submissions from health bodies called for the regulation of radiation protection in the mining industry to follow best practice regulatory principles. Information from the Radiation Health Series and the Radiation Protection Series should be used when formulating policy and all workers should submit dose records to the Australian National Radiation Dose Register (ANRDR).

To ensure uranium workers can keep track of their radiation exposure, the Commonwealth established the ANRDR to record the annual radiation dose received by each uranium worker. The uranium industry supports the Register and has argued for its extension to other occupations that work with radiation. The Association recommends that Queensland commits to participation in the Register. The State Government is requested to ensure that uranium mining companies operating in Queensland contribute radiation dose data for their employees for inclusion in the ANRDR.

The union's submission called for ongoing research and funding into suitable radiation dose limits for workers in particular.

Environment

The UMIC was tasked with investigating what environmental safeguards are associated with the mining, transport and export of uranium.

Flooding issues

Submissions received from environmental groups and the research community called for appropriate long-term design for flood management. They believe that the areas being considered for uranium mining are prone to potentially devastating flooding and that planning for at least one in 1000 year flood event is critical.

There is concern that flooding may flush radioactive materials across wide areas, into streams and river catchments, onto farming areas and remote communities.



Local government issues

A submission from the Charters Towers Regional Council expressed concern about water in their local area, particularly the Burdekin River and its tributaries, being contaminated by uranium mining operations at Ben Lomond. The council is concerned that contaminated water will escape from leach ponds and compromises the region's cattle and agricultural farms.

There is also concern about dust issues at Harvey Range from the transportation of uranium, if it is exported from the Port of Townsville facilities. The council understands these issues will be dealt with under the normal mining application and approvals processes.

A local government submission also called for the environmental management framework to provide for the cumulative impact assessment of multiple uranium mining projects, similar to the approach currently applied to underground water impacts from coal seam gas activities.

Waterways

Submissions received from environmental groups show concern about the impacts of uranium mining on waterways. They state that Queensland uranium sites sit on important waterways and that the mining may further deplete water sources as well as contaminate significant waterways and their communities with radioactive tailings.

Wildlife

A submission from a health body stated that Australia is developing guidelines on radiation protection of wildlife in natural habitats to ensure that a uniform national approach is adopted in line with international best practice.

Environmental concerns

Submissions from environmental groups expressed concern about the impacts a potential incident would have on the environment. They believe that something can be best practice and still have disastrous consequences. They state that since its opening in 1981 an estimated 150 spills, leaks and licence breaches have occurred at the Ranger Mine.

Best practice environmental management

Submissions from industry bodies consider that the existing Queensland mining legislative regime is consistent with best practice, so minimal amendments are required to accommodate uranium mining. They believe that except in relation to radiation-specific issues, it is appropriate to regulate uranium mining in the same manner as for any other mineral. Systems that effectively control the radiation hazard at a uranium mine are a specialised subset of occupational hygiene management systems that apply to any workplace that handles hazardous materials.

The submission recommends the following adjustments are warranted to environmental protection processes already available in Queensland:

- Uranium specific supplementary model terms of reference in relation to preparation of EIS.
- A model environmental authority (EA) for general application to uranium mines as a starting point and site specific conditions then for negotiation. Uranium model conditions could be considered as a supplement to the current EA model conditions currently under development.
- Extension of model EA conditions as conditions to development approval and other regulatory approvals relating to transportation, storage, shipping etc. that occur off a mining lease.
- Extension of the Supervising Scientist Division (SSD) role in monitoring for Queensland.



Rehabilitation

The Committee was tasked with investigating uranium mining rehabilitation requirements, standards and the use of appropriate financial or other assurances. A number of sub-headings are used in this section due to the volume of comments received and the different topics covered.

Tailings

Submissions received from environmental and conservation groups were focused on the long-term nature of uranium mine tailings and cost of managing the waste. The requirement for uranium tailings from the Ranger Mine in the Northern Territory to be isolated from the environment for 10,000 years is regarded by these groups as an industry benchmark. They believe the 10,000 year standard should be a Commonwealth requirement for operations at all current and any future uranium Australian mining operations.

Submissions from environmental groups and a union also questioned the long-term costs associated with rehabilitating mine sites and the possibility that these ongoing costs would become a burden for the Commonwealth Government and taxpayers.

Cost recovery

Submissions were received from environment groups who were concerned about the costs associated with the rehabilitation of uranium mines.

Environmental groups state there is no evidence of successful uranium mining rehabilitation in Australia and that it is imperative to the economic protection of any state or territory to view uranium as different to other minerals. They state that rehabilitation and remediation of uranium sites has proven to be more expensive than anticipated, are problematic to manage and require extensive management and remediation to ensure the safety of the site.

Submissions from environmental groups also state that best modern practice requires a whole-of-life mine plan including proposed plans for rehabilitation. To cover the estimated costs of rehabilitation a bank bond is normally required and plans are revised regularly to take into account changing conditions.

Best practice

Submissions from industry groups commented that rehabilitating a uranium mine relies on the same principles, frameworks, standards and general guidelines that apply to rehabilitating any mine, with the added issue of addressing the potential for the post-mining landform to have low levels of radioactivity. Industry groups explain that while levels of residual radioactivity remain low, it is appropriate to apply restrictions on post-mining land use at some sites.

These submissions understand that leading practice environmental management means a company plans for its closure requirements at the earliest stage in any mining operation, and regularly reviews and updates this plan. For example, the technology and practice available at the time of a mine's closure may be different from that was available when a mine commenced operation. While rehabilitation and closure plans will always be integrated with mine management plans, it is important that rehabilitation plans be regularly reviewed and updated. A vital principal is for mine operators to estimate and re-estimate the cost of rehabilitation.

These industries also support proactively engaging with the local community to discuss rehabilitation issues and to contribute to these discussions.



A submission from the research community stated that there are no legislative requirements for a mine closure plan, or for a life-of-project rehabilitation plan as part of the environmental assessment process. The submission recommends that closer collaboration between the DEHP and the DNRM is required to ensure that new uranium mines are designed from the outset to manage long-term legacies and meet environmental standards and societal expectations.

Infrastructure and security

The Committee was tasked with investigating the infrastructure and security issues associated with the export of uranium from Queensland and interstate ports.

Submissions from industry bodies stated that the best commercial and logistical option for the export of Queensland's uranium will be to transport it to the existing port facilities in Adelaide or Darwin. They suggested a port in Queensland for the shipment of uranium would be beneficial but not essential.

Submissions from the North Queensland Bulk Ports Corporation (NQBP) stated it has the potential to transport mining and exploration plant and equipment as well as a facility for the transportation and export of uranium. The Corporation states it has a well-developed Maritime Security Plan, in-house port security officers and a well-developed emergency response plan and capabilities.

NQBP believes that the Port of Mackay can immediately respond to the needs of the mining sector while the Port of Abbot Point also presents opportunities as does the Port of Weipa, due to its remote location. The Port of Hay Point is unlikely to form part of, or support, the uranium mining industry of north Queensland.

Submissions from the Port of Townsville stated that the port is readily equipped to provide a gateway to international export markets for the state's uranium mines. The port stated it is ideally located near the proposed uranium sites, has extensive experience in handling classified dangerous goods, possesses an incident-free history of previous exports of uranium from the Mary Kathleen mine and has stringent safety regulations in place in relation to the export of uranium.

Submissions from a local government stated they were keen to explore the potential for uranium to be exported from the Port of Karumba, although they understand the difficulties associated with this, while another submission stated that uranium mining would lead to improved roads and electricity supply in their jurisdiction.

Best practice approvals

The Committee was tasked with establishing a best practice approvals process for the uranium industry. Many submissions from the industry bodies and local government included information about best practice approvals. There was a high degree of overlap between approvals and regulatory frameworks, with many stakeholders seeing these as inter-related.

To help clarify the feedback received on this complex issue, analysis has been undertaken in the areas of State and Commonwealth coordination, the strengths and weaknesses of existing approvals frameworks, existing Queensland Government approvals frameworks, other State Government approvals frameworks and requirements for best practice systems.

State and Commonwealth Government coordination

Submissions from industry groups stated that approvals for uranium mining in Queensland can be accommodated within the existing framework; however the system needed to be streamlined to reduce duplication and inconsistency.



Most of the submissions stated that the Queensland Government should engage with the Commonwealth Government to implement appropriate bilateral agreements to ensure a more streamlined assessment and approvals process.

There was support for greater interaction and collaboration between agencies to reduce regulatory duplication. It was suggested that the Council of Australian Governments (COAG) processes could help do this.

In recognition of the specialist expertise held at Commonwealth level, another point of view was for the State Government to conduct the assessment and approvals processes. A further suggestion was for the approval processes to be carried out by a single point of contact between the company and authorities, regardless of how many governments and authorities are involved.

Strengths of existing approvals frameworks

Comments from industry groups about the strengths of the existing approvals framework:

- it is robust and functional
- applies standards and guidelines consistent with 'world best practice'
- has outcome based regulations which achieve environmental management
- provides comprehensive regulatory controls throughout the supply chain
- consists of a comprehensive assessment of all environmental impacts and is driven by the level and likelihood of impacts
- has bilateral agreement for fast tracking and streamlining assessment and approval processes involving matters under the EPBC Act.

Weaknesses of existing approvals

Comments from industry groups about the weaknesses of the existing approvals framework:

- duplication and inconsistency of regulatory requirements resulting from overlap of Commonwealth and state spheres of responsibility
- overly complex
- time consuming
- extraordinary justification is required for the approval of uranium mining projects
- Queensland authorities will have little practical experience in assessing uranium mining proposals as uranium has not been mined in Queensland for more than 30 years.

Existing Queensland Government approvals framework

Submissions were received from industry bodies, local government authorities and the Commonwealth Government relating to the existing Queensland Government approvals framework.

Submissions from industry bodies believe that Queensland has made progress to facilitate and streamline approvals for mining and petroleum activities as well as simplifying tenure processing.

They also believe that initiatives put in place to assist the coal seam gas and broader mining industry could also be adopted in the uranium context. Specifically the development of model conditions for inclusion in environmental approvals (EAs) and the development of model terms of reference for EIS applicable to uranium mining.



Submissions from local government state that the current Act is applicable to uranium mining and that the Federal Department of Resources will assist in the development of any new required protocols. They also consider that the current process of assessing environmental authorities for mining activities is reasonable as it includes public notification of draft environmental authorities. There is concern that local government is constrained in its capacity to respond in a timely manner to very complex and technical environmental management issues

A local government submission called for assurances that the relevant state agencies are to be appropriately resourced to monitor and enforce compliance of environmental management. It also recommended that for larger-scale resource projects, it is critical that the approvals process and conditions of grant for the tenure accurately reflect the outcomes of the EIS. It states that making these connections between EIS outcomes and tenure approvals is critical to managing local impacts and that while the consultation process typically involves council as an advisory agency, there is opportunity to improve the extent of council's engagement throughout the EIS process to achieve consistent and coordinated responses to local impacts.

The submission from the Commonwealth Government provides some detailed suggestions and recommendations with regards to the approvals frameworks. It states that the most important feature for the approvals framework is for governments and authorities to bring a unified approach to their engagement with a proponent. They suggest that 'best practice' occurs through a single point of contact between the company and authorities and regardless of how many governments and authorities are involved.

The submission states that a 'first time' uranium project process in a State is likely to be perceived as particularly challenging, especially on radiological issues. Mining companies believe that authorities are sensitive to external critics and apply tests or make requirements of proponents to justify their assessments to critics rather than applying only reasonable tests required by the assessment and approval process.

The submission states that companies believe authorities are right to be aware of uranium sensitivities but believe they should not be overawed by them and should leave the management of public concerns to the political process. The submission recommends possible ways of dealing with this include separating the regulatory and the political processes i.e. authorities should concern themselves mainly with the assessment and approval process in a technical sense, leaving the management of the 'uranium politics' to the political process.

Other State Government approvals frameworks

Submissions were received from industry bodies that provided feedback and recommendations based on approvals frameworks that exist in other states or nationally. A submission states that Western Australia has only recently developed its policies on uranium mining, handling and transport and that these were benchmarked on Northern Territory and South Australian policies. As such, it is recommended that Queensland Government emulate Western Australia's system and processing operations to ensure streamlining of regulatory approvals. They believe it is vital that projects are assessed upon their merits and not choked by regulation that will not significantly impact environmental values.

Another submission believes there are positive lessons to be drawn from the regulatory approaches in other Australian jurisdictions. The ARPANSA Codes of Practice for Radiation Protection and Radioactive Waste Management in Mining and Mineral Processing ('Mining Code') and for the Safe Transport of Radioactive Material ('Transport Code') have been adopted efficiently and reasonably consistently adopted by other State Governments. Generally this is through legislating obligations to comply with the codes and offences for failing to do so.



Requirements for best practice system

Submissions from industry, environmental groups and the Commonwealth Government provide advice and recommendations on the requirements for a best practice approvals system.

Submissions from industry believe that best practice occurs where companies and authorities establish dedicated teams with the necessary expertise to work through the approvals process. One submission recommends the DNRM appoint a case manager for uranium approvals to assist proponents to navigate state agency approvals processes. Other recommendations for best practice include:

- Prior to the commencement of the assessment process, agreement should be reached between the proponent and authorities on the assessment process, including the assessment and approval pathway, data requirements and mechanisms for resolving issues that arise during the process.
- Companies and the approval organisation should continue to engage after the approval has been given and implement a process to share knowledge gained as a result of participation in the assessment and approval process.
- Uranium approvals must be viewed as commercially viable in order to attract investment from exploration companies. The system must be efficient and reduce additional processes based purely on mineral type.
- Utilising existing mechanisms for the approval process including normal environmental impact assessment
- Radiation protection will need to be considered during the approvals process, as with other hazards, and this should include assessment of impacts to the workforce, the public and the general environment.
- The approval system must be 'outcomes' rather than 'process' focused.
- Any additional regulatory processes or requirements should replace existing processes.

It was noted that terms such as 'best practice' and 'world's best practice' do not necessarily imply a process and outcomes should not be universally applied to each and every activity. Some outcomes such as radiation dose limits and water quality standards are prescribed in legislation and based on rigorous scientific assessment. Many other outcomes need to take into account the site specific environmental impacts.

Submissions from the environmental groups state that while best practice regimes determined by the uranium industry may decrease certain risks in the process, they do not alleviate them.

The Commonwealth Government submission provided detailed recommendations for best practice approvals:

- multiple authorities working through a single point of contact with the proponent, under an agreement about how the process will unfold with thorough preparation on both sides
- clarity about the authorities' data and other information requirements, timetables and schedules
- clarity about the roles of companies, authorities and ministers in the process
- understanding by authorities of the technical aspects of projects and project history
- understanding by proponents of the pressure on ministers and authorities
- mechanisms for resolving problems and issues that arise during the process
- clarity about the criteria on which approval will be based
- consistency from project to project.



Cost recovery

The UMIC was tasked with developing appropriate cost recovery mechanisms for State Government regulatory activities, proportionate to the regulatory effort the industry imposes and consistent with promoting best practice regulation.

Submissions received from industry groups stated that the usual cost recovery mechanisms applicable to mining activities in Queensland, including tenure and environmental authority application fees, rent and the safety and health levy, should be applied to uranium.

A submission from a union stated that companies must demonstrate their capacity to provide adequate funding to cover the costs of environmental damage and the long-term rehabilitation costs associated with uranium mining. Submissions from environmental groups also questioned the long-term costs associated with rehabilitating mine sites and the possibility that these ongoing costs would become a burden for the Commonwealth Government and taxpayers.

Royalties

The Committee asked stakeholders to consider the most appropriate royalty regime for Queensland. Several submissions received from industry groups and one from an environment group included relevant feedback about royalties.

Most submissions stated that the Queensland Government should set a competitive royalty rate for uranium of 2.5 per cent. They noted that this was the same as other mineral types, which would be appropriate. Other submissions did not give a specific rate but stated that the royalty rate needed to be competitive as competitive royalties are a key component of any decision to invest in any mine. One submission called for profits-based royalty rather than a revenue-based royalty due to the impost of a revenue-base royalty.

Submissions also stated that if the industry is to be competitive in the early stages, consideration should be given to concessionary periods.

The submission from an environmental group stated that short-term royalties and taxes from uranium mining should be evaluated against projected long-term costs for rehabilitation, health costs and environmental impacts based on known experience of uranium mines in other jurisdictions of Australia.

Target areas

The Committee asked for information from industry about target areas for exploration beyond the existing known basins.

Submissions received from industry groups identified only the known uranium deposits in Queensland, including in the north-west mineral province region centred on Mount Isa and west from Townsville. Submissions stated that these sites were the most logical location for initial uranium mining operations to commence in Queensland.

Submissions from local government and the research community also made reference to these sites. The local government submission welcomed the reintroduction of uranium mining in their area.



Other

Stakeholders provided additional information that is relevant of the Committee to consider but which is not specific to the Terms of Reference. The main themes of other feedback are summarised below.

Communication and consultation

Other matters that are relevant to implementing the government's decision to recommence uranium mining in Queensland include communication and consultation.

Several submissions from industry groups stated that given the community concerns regarding uranium mining, it is essential community engagement is undertaken. Industry groups stated that transparent communication and community engagement are essential elements of best practice in the uranium industry.

The groups believe the State Government should carry out a communications initiative to address community perception in relation to uranium mining and that it is critical for mining companies to undertake continuous communication and engagement with communities during all project stages.

A submission from local government called for consultation to be carried out with local communities, and noted that given the nature of uranium mining, information should be disseminated to the public, particularly information regarding the management of environmental impacts.

A submission from Port of Townsville Ltd stated the importance of communication and consultation to reassure the community and alleviate negative perceptions that exist about uranium mining.

Planning

Other matters that are relevant to implementing the government's decision to recommence uranium mining in Queensland relate to planning issues, particularly by local governments.

Submissions were received from local governments that addressed potential land use conflicts, information sharing with State Government and improving systems to support local government planning processes.

The local government authority considers that any potential land use conflicts from the recommencement of uranium mining is a State Government responsibility and should be addressed as part of the regional planning process. The State Government's resource interests (including uranium mining) under the new State Planning Policy should be appropriately reflected in statutory regional plans. There should be sufficient flexibility in regional plans to allow for local circumstances, including frameworks around overlapping tenure and land access.

A further local government submission recommended that there is scope to improve information systems to support local government's strategic planning processes.

There is also a recommendation to consider legislative amendment to improve engagement of council in project impact assessment. It is recommended the *Resources Act 1989* be reviewed to safeguard the interests of local government and provide information critical to council's infrastructure and service obligations in the local community.



Investment

The UMIC asked what key considerations companies would factor into their decision to pursue uranium mining in Queensland.

Submissions from industry bodies stated the importance of providing a regulatory environment that ensures Queensland's uranium exports are competitive. Industry bodies identified the importance of maintaining a consistent and fair regulatory regime that minimises unnecessary regulatory burdens. The group also suggested that support for the ongoing operation will remain a critical component of any investment decision. Other considerations include tenure and having a royalty regime that balances financial return to the state with the financial return to the company.

Submissions from environmental and conservation groups stated that the economic benefits of uranium mining have been overestimated, that the costs are high and it is unlikely that the industry can provide a significant long-term economic benefit.

Community health

Submissions were received from health bodies which provided details on their concerns about uranium mining on the community in general. This information is considered to be relevant to the Committee's investigation.

Submissions from industry recommended that the State Government employ specialists with a focus on the effects of uranium on workers and the community generally.

Submissions received from environmental groups were largely concerned about the short-term and long-term health impacts of exposure to uranium and other radioactive materials. These groups believe there are clear lessons to be learnt from the experiences of asbestos mining and the importance of establishing a fund to cover future compensation costs.

These groups suggest that there may be a link between uranium mining and poor Indigenous health in communities residing near uranium mining operations. With regards to the Jabiru community they believe radioactive contamination of their waterways is a common occurrence which puts stress on the environment and threatens their traditional lifestyle.



Key themes

Based on the findings within the submissions, and the data gathered from stakeholders, the following general conclusions are made for the information and consideration of the Committee.

- With the notable exception of environmental and conservation groups, stakeholders generally support the recommencement of uranium mining in Queensland.
- The two issues of greatest concern are the rehabilitation and remediation of uranium mining sites, and the appropriate treatment of radioactive substances, both short and long-term.
- Mining of uranium is considered to adopt similar processes, practices and therefore require similar approval and regulation processes to other types of mining activity, with the exception of the safe handling, storage and rehabilitation of radioactive substances.
- The current regulatory regime for mining is considered to be satisfactory for uranium mining, with additional measures to address radiation.
- Environmental groups expressed concerns about potential environmental damage, community risks from radioactive waste, handling and transport and concerns about the end use of uranium for energy and weapons.
- Indigenous communities are expected to benefit from uranium mining through jobs and royalties; however these communities must be able to exercise choice and have proper consultation processes and agreements in place.
- Indigenous community health, and traditional hunting and foraging lands must be protected and appropriate monitoring programs put in place.
- Royalties should be in line with those set for other mineral types i.e. 2.5 per cent, to ensure the industry could be competitive. Consideration should be given to concessionary periods in the early stages of industry development.
- Royalties should reflect the long-term costs for rehabilitation, health and environmental impacts which can occur.
- Cost recovery mechanisms as they currently apply to mining activities, for example tender and environmental authority application fees, rent and the safety and health levy should also apply to uranium mining.
- Companies should demonstrate their capacity to adequately fund rehabilitation of mining sites and pay for environmental accidents, to ensure additional costs are not borne by taxpayers. Bank bonds should be considered and plans put in place from the outset to manage these risks.
- The existing provisions of the *Mining and Quarrying Safety and Health (MQSH) Act 1999* are generally appropriate to workplace health and safety, with some additional detailed prescriptive requirements in relation to worker radiation exposure limits. Best practice information from the Radiation Health Series and the Radiation Protection Series (who) should inform these provisions.
- Social impacts, similar to those experienced in other resource area, may result from uranium mining. These include housing availability and affordability and the social issues that can result from the introduction of FIFO workforces to small communities.
- Regional communities are expected to benefit from economic development and employment opportunities however policies are required to ensure that local businesses benefit, for example, the utilisation of the Industry Capability Network (ICN).
- The State Government should work with the Commonwealth Government and other states to streamline transport licence provisions to ensure more efficient transporting of uranium by road and remove any inconsistencies.



- There should be consultation with local councils and other authorities to determine road transport routes, and robust incident response plans. Planning for transport routes must be appropriate for Queensland's environmental and climactic conditions.
- The most likely export points for uranium mined in Queensland would be through existing Northern Territory or South Australian ports; however some Queensland ports are seen as having the capacity and capability to be developed as uranium export facilities.
- Some Queensland ports have the capability and capacity to bring in plant and equipment required for uranium mining.
- The Queensland Government should engage with the Commonwealth Government to implement appropriate bilateral agreements to ensure a more streamlined assessment and approvals process.
- There are concerns about the nature of uranium mine tailings and the long-term cost of managing the waste.
- Whole-of-life-cycle planning is required to include a mine closure plan and ensure that long-term legacies and rehabilitation are planned for from the outset of the mining venture.
- Mine planning should take account potential flooding issues and plan for at least a one in 1000 year flood event to mitigate the risk of radioactive materials flushing into waterways (ground and surface).
- For best practice environmental management, the existing Queensland mining legislative regime is generally appropriate, with the addition of workplace hazard standards used to manage radiation hazards.
- Model terms of reference for a uranium mine EIS are recommended, in addition to model conditions and a model environmental authority.
- The State Government should take a proactive lead role in providing information and education about uranium mining and that consultation should be carried out with local communities.



Appendices

Appendix A – Letter to stakeholders

Dear XXXX

Resumption of uranium mining in Queensland

On 22 October 2012, the Honourable Campbell Newman MP, Premier, and the Honourable Andrew Cripps MP, Minister for Natural Resources and Mines, announced the resumption of uranium mining in Queensland.

To oversee the resumption of uranium mining in Queensland, the Premier has established a Uranium Mining Implementation Committee (the Committee) to recommend a best practice policy framework for the orderly development and operation of a uranium mining and export industry in Queensland.

I have been appointed as Chair of the Committee, which includes other members with a strong and diverse skill set. Other members of the Committee include:

- Mr Dan Hunt, Director-General, Department of Natural Resources and Mines;
- Ms Noeline Ikin, Chief Executive Officer, Northern Gulf Resource Management Group;
- Ms Frances Hayter, Environment Director, Queensland Resources Council;
- Dr Geoff Garrett, Queensland Government Chief Scientist; and
- Mr Warren Mundine, Director, Australia Uranium Association and Indigenous Leader.

The role of the Committee is to advise the Queensland Government on a framework that will ensure that uranium mining resumes with world best practice environmental and safety standards, whilst creating an attractive environment for investment. I have attached a copy of the Committee's Terms of Reference for more information.

As an organisation with a significant interest in this matter, the Committee is seeking your feedback on what you consider will provide the foundations for best practice uranium exploration and mining. This will assist in developing a framework that is contemporary and reflective of practical industry experience. The attached document contains questions which will assist you in providing feedback.

The feedback you will provide will inform the final report that is to be delivered by the Committee. The report and associated recommendations are to be provided to the Queensland Government in March 2013.

Therefore, it would be extremely helpful if you could provide a brief written submission based on the questions outlined in the attached document to:

Uranium Mining Implementation Committee Secretariat

Attention Geoff Robson, Director

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Please be aware that it is the Committee's intention to release all submissions received publically on the Government's website. If you do not wish for this to occur, or require certain details to remain confidential (e.g. for commercial in-confidence reasons), please ensure to declare this upon submitting your submission to the secretariat.

I would appreciate receiving your submission by close of business 17 December 2012.

Yours sincerely

Councillor Paul Bell AM

Chair

Uranium Mining Implementation Committee



Appendix B – List of submitters

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Appendix C – Supplementary information

Submission number	Submission name	Attachment	Brief description	Date	Purpose
20	Friends of the Earth	Let the Facts Speak: An Indictment of the Nuclear Industry	A record of nuclear accidents as they occurred since the industry's inception with the Manhattan Project in 1942.	March 2012	This fourth edition was produced by the office of Scott Ludlam, Australian Greens Senator for Western Australia.
20	Friends of the Earth	Department of Employment, Education and Training – Jabiru Area School Annual Performance Report to the School Community 2007 Teaching and Learning National Benchmarks	An Annual report analysing Jabiru Area Schools performance.	2007	A regular publication developed by the Northern Territory Government for the school community.
20	Friends of the Earth	Aborigines and Uranium: Monitoring the Health Hazards	The discussion paper relates to the health and safety issues for communities living adjacent to uranium mining and milling operations.	December 2006	A Research Discussion Paper developed by the Australian Institute of Aboriginal and Torres Strait Islander Studies research program.
21	Conservation Council of Western Australia	Resolution: Global call to action for a ban on uranium mining	Argues uranium ore mining and the production of uranium oxide is a grave threat to health and the environment, human rights and an obstacle to nuclear disarmament.	29 August 2010	A resolution prepared for the International Physicians for the Prevention of nuclear War 19 th World Congress – Basel, Switzerland March 25-30, 2010
21	Conservation Council of Western Australia	Toro Energy Promotes Radiation Junk Science	Argues Australian company Toro Energy is irresponsible for consistently promoting the fringe scientific view that exposure to low-level radiation is harmless.	May 2012	For publicity campaign purposes.
28	Saskatchewan Mining Association	2011 Northern Socio-Economic Benefits Summary – Saskatchewan Mine Surface Lease Agreements	To identify benefits to northern Saskatchewan from mining operations (predominately uranium) in the region.	October 2012	Developed by the Government of Saskatchewan by the Ministry of Government Relations, Municipal Relations and Northern Engagement.



Submission number	Submission name	Attachment	Brief description	Date	Purpose
28	Saskatchewan Mining Association	SMA Uranium in Saskatchewan	SMA Uranium Fact Sheets on the Saskatchewan uranium mining industry, as of the end of 2011.	2011	Publicity material for industry association.
28	Saskatchewan Mining Association	Mineral Exploration Guidelines For Saskatchewan 2012	Excerpts taken from the Mineral Exploration Guidelines For Saskatchewan 2012 document including Mineral Exploration Application Guidelines, drilling on Land and Drilling on Ice.	2012	Developed by the Ministry of Environment, Department of Fisheries and Oceans Canada, Saskatchewan Watershed Authority, Ministry of Energy and Resources, Mines Branch.
30	Cameco Corporation	The Cameco CSR Five Pillar Strategy	A strategy aimed at building and maintaining the support of the communities with whom Cameco work.	Not specified	Internal corporate strategy document.
30	Cameco Corporation	Empowered – Sustainable Development at Cameco	The report focuses on performance at all Cameco-owned global uranium mining and milling operations and their refining, conversion and fuel manufacturing operations.	2012	An executive summary of Cameco's 2012 Sustainable Development Report outlining Cameco's activities in 2010 and 2011.



Site visit reports and Mt Isa consultations

Uranium Mining Implementation Committee Northern Territory (NT) Alligator Rivers region site visit 27 to 30 November 2012

Overview of uranium mining in the NT Alligator Rivers region

The regulatory regime for uranium stems from the Fox Royal Commission reports in 1976 and 1977. Controversy over mining in the area resulted in a complex and prescriptive regulatory regime, however high standards are required and met because of the Kakadu World Heritage area adjacent to the Ranger uranium mine (Ranger).

The high degree of regulation stems from the World Heritage status. The main 'uranium specific' issues for Ranger are radiation safety for workers, and security arrangements over both the mine site and transport. Water quality must test for radionuclides as well as the 'normal' contaminants that may be caused by mining.

Current consultative arrangements are very important to the oversight of Ranger, particularly the following groups:

Minesite Technical Committee (MTC)

- oversees operational approvals for the mine
- includes representatives of all government agencies and the relevant Land Council
- considers all reports and applications
- advises NT Department of Mines and Energy.

Alligator Rivers Region Advisory Committee (ARRAC)

- includes MTC members and other interested parties such as environmental NGOs
- stakeholder information exchange during meetings held twice a year.

Alligator Rivers Region Technical Committee (ARRTC)

- a scientific peer review group.

Meeting with Acting Supervising Scientist, Department of Sustainability, Environment, Water, Population and Communities (SEWPaC)

Key issues

The Supervising Scientist Division (SSD) has a very well-resourced program that supports a strict and rigorous compliance and monitoring regime at Ranger, along with a very well-resourced research program. The SSD role reflects the fact that Ranger is immediately adjacent to a very sensitive World Heritage listed property.

Extending the role of the SSD to other states is possible. SSD currently undertakes non-Ranger work on a consultancy basis. SSD also undertakes some assessment work for the Australian Government for applications that trigger the *Environment Protection*

and Biodiversity Conservation Act 1999 (EPBC Act), such as the WA uranium mine proposals and the Olympic Dam Mine expansion.

SSD also plays a key role in regulatory and consultative committees, such as the MTC. While some skills and knowledge pertain specifically to Ranger, much of the expertise is transferable to other sites, especially tropical climates.

Maintaining best practice

SSD maintains best regulatory practice through contact with the International Atomic Energy Agency (IAEA) to keep up with international standards. SSD maintains academic contacts through conferences and peer review to maintain a high standard of scientific skills. SSD is also involved in the ARRTC scientific consultative group. While the research and monitoring responsibilities of the Supervising Scientist are carried out by the Environmental Research Institute of the Supervising Scientist (ERISS), the supervisory or quasi-regulatory role is carried out by the Office of the Supervising Scientist (OSS). The OSS is involved in operational approvals for Ranger through the MTC.

Skills

SSD maintains a very high scientific skill base in-house.

Views were expressed during the Committee's visit that the regulatory framework for Ranger could be streamlined. There is a high level of complexity in the arrangements that do not contribute to good environmental performance. Some of the complexity has been overcome through new administrative arrangements, for example, the MTC. The main concern expressed was the potential for very minor incidents to get disproportionate and unwarranted attention in the media.

The SSD has frequent dealings with DRET through MTC and doesn't deal with SEWPaC as frequently as DRET.

Meeting with the Honourable Westra Van Holthe, MLA, Minister for Mines and Energy, Minister for Primary Industries

The Minister indicated a strong desire to work with Queensland, including on transport issues. The Minister has a strong emphasis on cooperation and development in northern Australia.

The Minister indicated support for pursuing the possibility of Queensland uranium being transported through the NT. He said that rail is desirable in the long-term context of a 'Mount Isa spur' to the north / south line from Adelaide to Darwin. However, he also noted that the Barkley Highway is a good road and capable of handling the transport of uranium.

While the transport of uranium will have challenges, the NT is experienced and equipped to handle this material. The Minister also emphasised the importance of good public communication and transparency around development plans.

The Inpex LNG project was cited as a good example of effective public communication. The project kept the NT community informed of its activities with regular advertisements regarding its development plans and the benefits from the project.

The Minister supports a four state group cooperating on uranium mining including on public relations.

Meeting with Chief Executive, Department of the Chief Minister, and Chief Executive, Department of Mines and Energy

Key issues

Officials are keen to work with Queensland, including cooperating on transport matters. The NT is recommending a new interstate group to cooperate on the logistics of uranium mining.

It is understood that the potential volume of uranium produced in Queensland means road transport is needed. Cross border issues should not be a problem, however, the NT will need to demonstrate it has safe solutions in place for transport.

Main community concerns

Water management is a key concern. Officials said it is critical to get this right and have it well monitored. Stakeholders focus on any discrepancy in the data, which becomes the focus of debate in the MTC and ARRAC. It was noted that SSD handles debate in Canberra well.

Presentation by Department of Mines and Energy

The presentation confirmed that much of the regulatory regime relates to mining generally, as opposed to a 'uranium specific' system. The presentation confirmed the overly complex regulatory structure does not reflect a modern world best practice approach to regulation (see diagram showing the overview of the NT regulatory system for more information regarding the complex relationship between agencies and stakeholders).

Meeting with Darwin Ports Corporation

The meeting included a presentation on the Port of Darwin (the port), its history, associated activities and development plans. This was followed by an inspection of the port. The Committee representatives observed warehouse and storage facilities in the port precinct, including the NQX facility that stores uranium (observed from the roadside only. It is not a large facility and handles a range of freight).

Observed quay area included bulk handling ships, quarantine areas and railhead. The port has significant expansion plans. It is likely that the port would welcome additional uranium consignments from Queensland.

Meeting with NT Worksafe

NT Worksafe is the regulator for the NT Government's occupational health and safety regulations. This includes mining (unlike Queensland there is not a separate mining safety regulator).

NT Worksafe indicated that most uranium health and safety issues were common with other mining industries. The main exception is the requirement for radiation safety plans for the site and workers. NT Worksafe also indicated that a transport permit would be needed by any company transporting uranium from Queensland through the NT.

Ranger uranium mine

During the Committee's site visit, the General Manager of Operations for the Ranger uranium mine discussed the regulatory and consultative regime governing the mine. He confirmed the key priorities at Ranger are radiation health and safety and water management. While radiation doses are very low they are carefully monitored. Dust management is also critical. Other safety priorities are common to mining operations and industrial processes, such as precautions around ammonium and acid used in ore processing.

Water issues relate mainly to World Heritage status and climate. Salinity is a key issue. Radionuclides are also monitored. All water is retained on site. All spills and incidents are recorded – even minor hydrocarbon spills. For example, a drilling contractor had a simple leak from a hydraulic which required the preparation of an incident report. The Committee also:

- observed milling and ore processing operations
- observed uranium packing operations
- observed security arrangements and discussed this with senior site manager (the Australian Safeguards and Non-Proliferation Office (ASNO) requires whole of supply chain oversight by Ranger).
- visited pit viewing site and discussed process for pit rehabilitation. Rehabilitation plan focuses on protecting adjacent World Heritage area.

Meeting with Gundjaihbi Aboriginal Corporation (GAC)

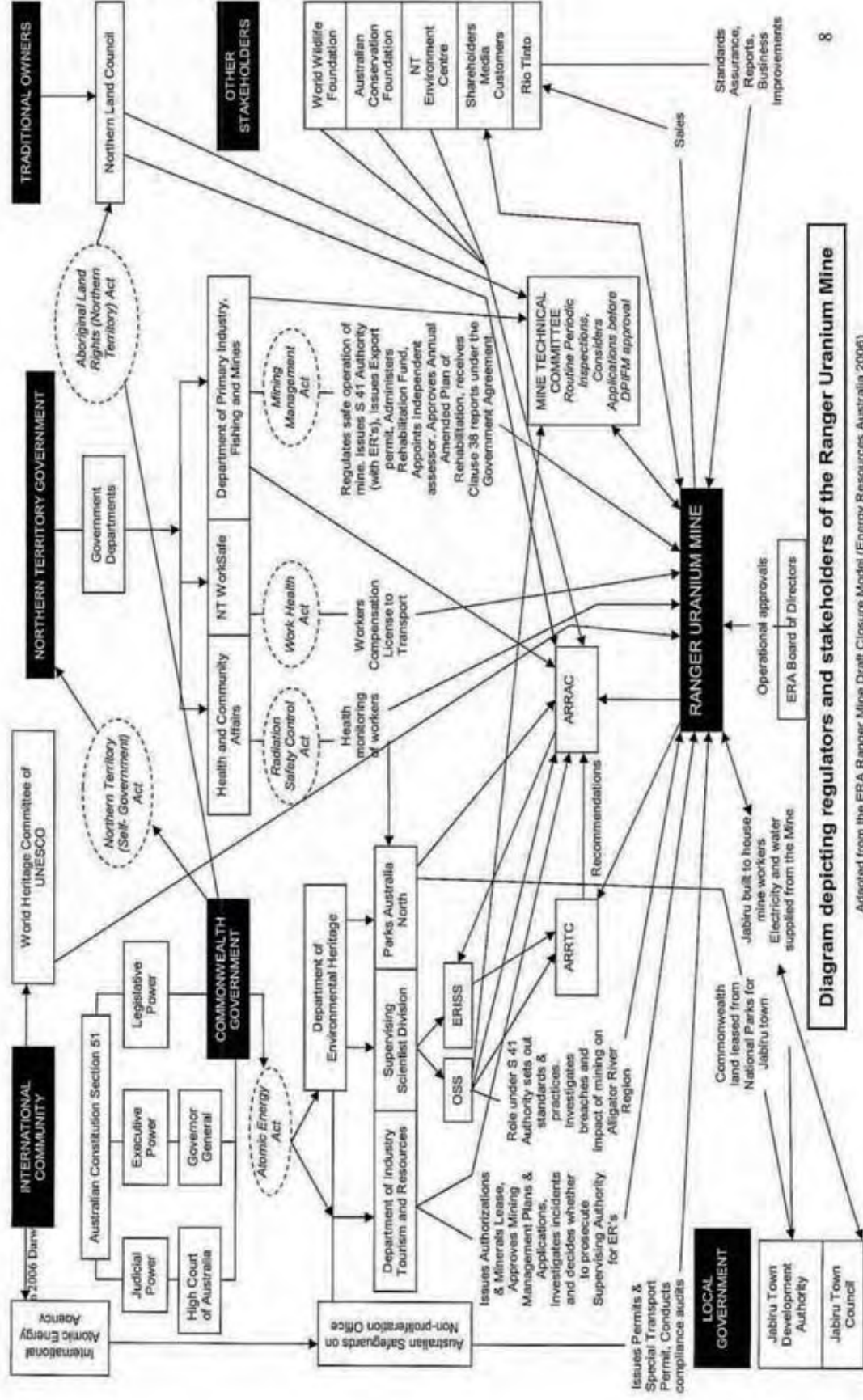
The GAC represents the local Mirrar traditional owners. A brief history of the area and Indigenous relations with government and industry was given.

GAC recommended a consultative structure that provided strong engagement with stakeholders to build confidence. This includes sharing and explaining detailed data and operational information.

GAC's membership of the MTC is resource intensive but its funding allows it to engage scientists. This exact model may not be appropriate in Queensland, but a strong stakeholder committee will be vital. The issue for Queensland is whether an advisory committee in north west Queensland would be for uranium or all mines.

Indigenous engagement models exist outside uranium, e.g. Kosciusko National Park.

Overview of Northern Territory Regulatory System



Adapted from the ERA Ranger Mine Draft Closure Model (Energy Resources Australia 2006)

Diagram depicting regulators and stakeholders of the Ranger Uranium Mine

**Uranium Mining Implementation Committee
South Australia (SA) site visit
18 December 2012**

Meeting with SA government representatives

Attendees:

Environment Protection Authority

- Director, Regulation and Compliance Division

Department of the Premier and Cabinet

- Director, Economy and Productivity
- Policy Manager, Security and Emergency Management Coordination

Department for Manufacturing, Innovation, Trade, Resources and Energy

- Director, Mining Projects Facilitation

Department of Planning, Transport and Infrastructure

- Director, Road Policy and Planning
- Senior Project Officer, Road Transport Policy and Investment

The Committee had a single meeting with a range of government officials which enabled a broad discussion across the whole approvals and regulatory framework for uranium mining.

SA takes a risk-based approach to regulation. By and large, uranium mining is regulated under the same framework as other mines. Additional (or varied) regulations relate to radiation safety, transport and security, as well as stakeholder relations.

Radiation safety

The SA Environmental Protection Agency (SA EPA) is responsible for radiation safety. SA has adopted ARPANSA codes in its licensing of SA uranium mines. SA did note that each state employs these codes in slightly different ways, so the Committee may wish to look at a process that would support harmonisation among the states.

SA EPA has mining regulators embedded in its radiation protection branch. SA did note there is a national shortage of radiation safety experts.

Transport and security

Transport plans must be approved by Cabinet for any uranium transported through SA. The representatives queried the approach the Committee would take in its report on the issue of export ports. They said that uranium exports had been undertaken through Adelaide without incident for a long time and that any commentary from the Committee that appeared to reflect a desire to avoid uranium being exported through Queensland ports would undermine community confidence in SA and elsewhere.

The Committee responded by noting that commercial reality meant it was likely Queensland uranium would be exported through Darwin or Adelaide. However, the report would need to respond to the potential for a request in the future to export

uranium through a Queensland port. The Committee's preliminary view is that such a request would be considered against the existing framework for the export of hazardous materials, and the security requirements imposed by ASNO.

The SA representatives recommended that Queensland consider the BHP Billiton model for transport plans. The process for approving these plans involves significant interaction with state and federal agencies leading up to consideration by Cabinet.

A draft is first submitted to the South Australia Department of Premier and Cabinet (SA DPC), which is the regulator. The draft may then undergo iterations before going out to the broad range of state agencies for comment. A revised draft goes to the company while at the same time liaison with ASNO occurs. It then goes to Cabinet.

WA companies intending to export through Adelaide have not yet completed this process. Interestingly the review of draft transport plans only involves government agencies. Community consultation appears to be the remit of the Cabinet process.

About 30 shipping containers per month of uranium is trucked through SA from its mines.

The benefit of having a harmonised approach to transport became clear from the discussion and adds weight to the NT suggestion for an interstate committee to support this goal.

In terms of security, SA companies follow the ASNO requirements.

Stakeholder information

SA undertakes quarterly compliance monitoring and reporting on environmental performance of its uranium mines. This comprehensive data is published and made available to the public, which has enhanced confidence in the industry. This process has been in place for around 10 years.

In this context, the SA representatives noted that uranium mining is subjected to a higher degree of scrutiny than other mining activities and that an incident at one mine is an incident that can reflect on the industry as a whole.

The Committee members queried whether SA had considered the use of the Supervising Scientist Division (SSD) for monitoring activities. The SA representatives indicated that SA had a long history of uranium regulation and the SSD was never considered necessary. In addition, the SA climate is very different to the climate the SSD operates in. Finally, SA also considered that the SSD role in the regulatory framework of the NT reflected a prescriptive approach as opposed to the risk management approach of SA.

BHP Billiton

The Committee met with the Logistics Manager and Uranium Distribution Coordinator for BHP Billiton's Olympic Dam mine. The Radiation Protection and Management Consultant also attended the meeting.

BHP Billiton has extensive experience mining uranium in SA. BHP Billiton's uranium production is a co-product of other metals at the Olympic Dam mine. Uranium mining generally faces the same challenges as other metalliferous mines, although radiation management and transport create additional requirements compared to other mines.

BHP Billiton emphasised the benefits of a performance-based approvals framework, indicating that SA had a good regime, whereas the NT and WA regimes are more prescriptive. A regulatory system should focus on achieving good outcomes and avoid being unnecessarily onerous.

In terms of the SSD, the performance of the Roxby Downs mine in the early 1980s demonstrated the competency of the industry and the regulators in SA, so the SSD was not needed in SA.

However, it was emphasised that state based regulators should maintain skills and competency, so that the good performance of an industry does not lead to complacency. In this context, maintaining links with skilled areas, for example, universities or the SSD, could assist Queensland maintain 'best practice'.

The delegation also emphasised the importance of educating the public and stakeholders on the nature of uranium mining and the performance of the industry.

**Uranium Mining Implementation Committee
Western Australia (WA) site visit
19 December 2012**

Meeting with WA government representatives

Attendees:

WA Department of Mines and Petroleum

- Director General
- Principal Project Officer, Uranium
- Senior Environmental Officer, Uranium
- Project Director, Reform Group

Office of the Environmental Protection Authority (EPA)

- Director, Assessment and Compliance Division
- Environmental Officer, Uranium Assessments

Radiological Council

- Health Physicist, Radiation Health (mining)

WA Approvals Framework

WA lifted its ban on uranium mining in 2008. The first mine, Toro Energy's Wiluna project, lodged its final environmental impact statement (EIS) in December 2011, and received approval from the state government in October 2012. The federal Minister, the Honourable Tony Burke MP, Minister for Sustainability, Environment, Water, Population and Communities, has deferred his decision to March 2013 to seek further information about the project.

In WA, uranium mines are assessed through a similar process to other proposals, which trigger the EPBC Act and involves a large number of environmental factors. The process for the Wiluna Project has been slightly different as a longer public consultation period was required. The Department of Mines and Petroleum (DMP) is the 'lead agency' through the approvals process and coordinates all state based approvals.

The assessment process for this mine was conducted under WA's bilateral agreement with the Australian Government for EPBC Act assessments.

WA identifies similar community concerns about uranium mining as experienced in other jurisdictions. Excluding those common to other types of mines, specific concerns include:

- transport of uranium
- public and worker health impacts
- use of uranium in nuclear power and weapons
- long-term contamination of the environment
- closure and rehabilitation of uranium mines.

Upon lifting the ban, the WA Government undertook an internal review of the adequacy of the existing approvals framework as it applies to uranium mining. Following the internal review, the Minister for Mines and Petroleum appointed an independent uranium advisory group to review the regulatory regime for uranium mines in WA and provide advice which would align this regulatory regime with world's best practice. The uranium advisory group's report was released in 2012.

Following these reviews it was found no new legislation was necessary to introduce uranium mining. A uranium mine proposal triggers the existing WA Environmental Protection Act, EPBC Act and radiation legislation including WA's *Radiation Safety Act 1975* and Part 16 of WA's Mine Safety Inspection Regulations.

Role of the Supervising Scientist Division

The Committee asked why WA had not sought the use of the SSD. In response, WA officials noted that the regulatory process in the NT was overcomplicated and WA did not wish to copy it. WA also has around 50 years of managing the mining of mineral sands, which is also a naturally occurring radioactive material.

However, the importance of independence in the reporting on environmental performance of uranium mines was emphasised. WA officials indicated this could be achieved through an independent body reviewing uranium mine reporting and data monitoring, with site audits every two years. This role could be undertaken by the SSD, universities or the CSIRO.

The SSD has played a role in the assessment process for uranium mines in WA under the bilateral agreement with the Australian Government which includes the SSD. WA's EPA received a number of comments from the SSD during the assessment of the Wiluna Project.

Radiation Safety

WA was the first Australian state to regulate the use of radiation through the *Radioactive Substances Act 1954* which was replaced by the *Radiation Safety Act 1975*.

The *Radiation Safety Act 1975* creates an independent regulatory authority, the Radiological Council, which reports to the Minister for Health and implements a system of licensing and registration for radioactive materials.

The *Radiation Safety Act 1975* requires the registration of all prescribed radiation sources and premises where equipment and substances are used or stored. A radiation management plan may also be required.

Transport is also subject to these licence and registration provisions. Any person who transports radioactive substances in WA must be licensed or work under the direction and supervision of a licensee.

The mining and milling of radioactive ores is jointly controlled under the *Mines Safety and Inspection Act 1994* through the WA Department of Mines and Petroleum (DMP). Cooperation between DMP and the Radiological Council is managed under a Memorandum of Understanding (MOU) and through the Radiation Liaison Committee.

WA's radiation regulations and conditions may adopt national and international standards and codes of practice. As an example, WA has adopted the recommended limits on exposure to ionising radiation set by the International Commission on Radiological Protection (ICRP).

Mine rehabilitation reforms

WA officials also outlined changes to bond arrangements for mine rehabilitation. WA's existing mining securities system is based on operators being required to lodge environmental bonds with the department prior to gaining approval to mine. These bonds are most commonly in the form of bank guaranteed unconditional performance bonds which are returned to the companies upon successful completion of rehabilitation works. If the company cannot meet its rehabilitation obligations, then the government accesses the bond to pay for the clean-up.

WA is considering a new proposal for a government-administered pooled fund, known as the Mine Rehabilitation Fund. This will provide a pool of funds which will be available to rehabilitate any mine at any time. Interest earned by the fund can be used to rehabilitate historic abandoned sites.

Cameco Corporation

Managing Director, Cameco Australia Community Relations Manager

Canadian-based Cameco Corporation (Cameco) is one of the world's largest uranium producers. Cameco has been actively exploring for uranium in Australia since 1996 and is involved in a number of projects across the country, but does not currently have any tenements in Queensland.

In mid-2012, Cameco announced an agreement with BHP Billiton to acquire the Yeelirrie uranium project in WA. In 2008, through a joint venture with Mitsubishi Development Pty Ltd., Cameco acquired the Kintyre project in WA. Cameco is currently the operator and hopes to bring Kintyre into production in future years.

The committee discussed the company's lengthy Indigenous engagement program with Traditional Owners at the proposed Kintyre mine.

It is clear that Indigenous engagement and the need to provide job opportunities is deeply embedded in Cameco's corporate ethos. Cameco emphasised the importance of a whole-of-mine life agreement with Indigenous people. It is also important to provide Indigenous communities with access to third party experts who can validate the commercial offers and information provided by the mining company.

Cameco noted that job opportunities may often start with ancillary work such as cleaning and catering. Over time further skills can be developed, but this takes a sustained partnership with the Indigenous community. Cameco's Canadian experience demonstrates that over time Indigenous people can join the senior ranks of the company.

Toro Energy

Executive General Manager, Wiluna Project Approvals and Community Director, Wiluna Project

Toro Energy discussed its experience in the approvals process for its Wiluna mine and the broad lessons taken from this experience. In particular, Toro Energy raised the need to address the gap between scientific knowledge of uranium versus community perceptions, the need to 'normalise' the approvals process, and the possibility of delays in the approvals process.

In terms of community perceptions, it is communities most affected by uranium mining that need to be the focus of consultation and education. Toro Energy took Indigenous people involved in its Wiluna project to SA to learn from the experience of uranium mining in that state, and also provided funding for independent advice on uranium and radiation.

Toro Energy also said first responders, i.e. emergency service workers, also need information about radiation and uranium. Regulators (i.e. state government officials) also need information to respond to concerns raised by the community and NGOs.

Toro Energy argued that uranium mining does not require any special or different treatment through the regulatory approval process. The Wiluna Project is a small operation, equivalent to a small gold mine, yet it was subjected to the most stringent public consultation process, usually reserved for much larger projects. Toro also indicated that the jurisdiction of different agencies within WA was at times "a bit blurry".

Given that Minister Burke had delayed his decision on the EPBC Act approval for the mine, Toro Energy also noted that uranium mining companies had to be prepared for delays in the process. This was a reality that was difficult for a company to avoid.

Uranium Mining Implementation Committee Townsville (Queensland) site visit 23 January 2012

Following is a record of meetings held in Townsville with:

- Townsville City Council (TCC).
- Townsville Enterprise Limited (TEL), Townsville Chamber of Commerce and Townsville CBD Taskforce.
- Port of Townsville CEO, Mr Barry Holden.

Common themes throughout all meetings were the need for public information on the mining and transport of uranium, and building engagement between the industry and

the Townsville community. This should occur in the context of both the potential for development of the Ben Lomond resource and the transport of inputs needed for mine operations in north or north west Queensland. On the latter, engaging the expertise of James Cook University, and the expertise of Queensland Health in the Townsville region were raised as possibilities.

Another theme was community concern regarding the final use of uranium. The Committee Chairman emphasised the Australian Government's role in relation to security and nuclear non-proliferation and the Committee's TOR rules out consideration of nuclear energy or accepting nuclear waste. The benefits of the uranium industry in medical and industrial applications and greenhouse gas benefits compared with other energy production were also discussed.

The uranium mining process was also discussed and the likely community concern regarding its potential impact on local water quality was raised. The history of Ben Lomond was raised in this context, along with the need for the Committee to demonstrate that environmental standards had improved markedly from 30 years ago.

Another potential community concern is the proximity of any mine to residential areas or farm residences.

TEL indicated its position to support uranium mining so long as it met the required environmental standards and there were demonstrated economic benefits to Townsville. This included the possibility of exporting uranium through Townsville.

The Port of Townsville emphasised its experience in both container and hazardous goods movements to underscore its ability to manage uranium exports. It also has primary and secondary security perimeters within the port areas and extensive CCTV security.

The opportunity for Townsville to take part in the transport of construction materials and other inputs during mine operations was discussed in all meetings.

TCC noted the commercial reality that Queensland uranium is likely to be exported through the existing licensed ports of Darwin or Adelaide, but noted that Townsville should not be excluded from consideration if industry sought to export through the port. In this case, any request should be assessed against existing environmental and (federal) security requirements.

TCC also asked about the likely timeframe for uranium production in Queensland. While it is a matter for proponents when the assessment would start, TCC noted that in areas like Mary Kathleen, uranium was present in tailings, together with other minerals. This gives rise to the potential for uranium oxide to be produced as a co-product, which may lead to a quicker start to the industry. A stand alone mine may take a few years to get to the production stage. TCC referred to the WA experience where the first mine is still waiting approval after the ban was lifted in 2008.

**Uranium Mining Implementation Committee
Mount Isa (Queensland) site visit
31 January and 1 February 2013**

Meeting with Summit Resources

Summit Resources provided background on their corporate structure, interests and assets. Summit Resources told the Committee that the existing framework and approvals process could largely accommodate uranium, but there is overlap. It recommended that the Committee address duplication in responsibilities such as radiation management and seek to resolve overlap between federal and state processes. Summit Resources also stressed the need for education programs based on scientific data to dispel any misconceptions about uranium.

Market prices and future production

From Summit Resource's perspective, the current spot prices between US\$40-45 per pound do not make projects commercially viable for most proponents globally. The objective for Summit Resources and its Valhalla/Skal deposit is to achieve a longer mine life.

Land access and engagement

Summit Resources considers that it has developed strong land access and engagement practices. Five conduct and compensation agreements have been developed under the land access framework. Additionally, the company has developed a model engagement protocol for Indigenous representatives. The focus of the engagement strategies is to foster inclusion and provide education on uranium.

Health and safety

Summit Resources informed the Committee about its health and safety management programs and systems (including radiation management plans). These are considered to be contemporary best-practice.

Meeting with Mount Isa Eastern Communities Traditional Owner Groups

The Committee met with representatives from the Mount Isa Eastern Communities. This included the Kalkadoon and Mitakoodi Traditional Owners.

Environmental impacts from uranium mining

The Kalkadoon Traditional Owners expressed concerns over the environmental impacts from uranium mining, including impacts on water quality and the management of waste. The Committee informed the representatives that there is only one site approved for waste disposal in Australia. Additionally, the purchaser of Queensland's uranium would be required to manage waste or byproducts.

The Kalkadoon representatives also emphasised the need to protect land for agriculture.

Given these concerns, Noeline Ikin suggested that Traditional Owners should be involved in the environmental monitoring process. The Kalkadoon representatives supported comments on the inclusion of Traditional Owners during the environmental monitoring stage, and that opportunities resulting from uranium mining should be broader than jobs and include training or ventures for Indigenous communities.

Meeting with Mega Uranium

Mega Uranium is the company that holds tenure over the Ben Lomond deposit in north Queensland. The Committee was advised that Mega Uranium's projects are largely at the exploration stage with the Lake Maitland (WA) deposit closest to production.

Market prices and future production

Mega Uranium stated that the current spot prices of approximately US\$40-45 per pound U_3O_8 are low. It considers that these prices reflect the bottom of the uranium price and expects prices to increase due to impending supply shortages (for example, end of the US and Russian Highly Enriched Uranium Agreement).

Ben Lomond

The Committee was informed that the ore grade at the Ben Lomond deposit is the highest of all current known uranium deposits. It is a multi-metal deposit with molybdenum present as well as copper and gold. The presence of other minerals may present other commercial opportunities.

The Committee raised recent media about an environmental incident at Ben Lomond (under previous tenure holders) where uranium was detected in Keelbottom Creek. Mega Uranium responded by saying that the mineralisation of the area results in higher levels of radiation. It is not specific to the drainage areas.

Transport and export of uranium

The high value/low quantity nature of uranium is such that Mega Uranium would be likely to utilise existing certified ports for export. It believes that the costs to upgrade ports in Queensland (for certification purposes) are greater than the returns generated from export activity.

Meeting with Southern Border Traditional Owner Groups

Representatives from Southern Border Traditional Owner Groups attended this meeting including Walawurra, Pitta Pitta, Duglanji, and Yulluna.

Concerns over environmental, health and safety impacts

The Traditional Owner Groups expressed concerns over the impacts that uranium mining may have on water quality and human health through radiation. They stated that the issues are life-long for the community given that they live on country. Therefore, government and proponents need to commit to action to provide ongoing monitoring while also addressing long term impacts.

The Committee advised attendees that the mining of uranium is similar to other metalliferous mines and does not pose higher risks than other forms of mining. The uranium extracted and consequently processed to uranium oxide is not highly radioactive. However, the meeting attendees stated that education programs should be conducted to communicate these facts.

Timing of uranium mining activities

Meeting attendees asked about the timing of uranium activities in the region. The Committee advised that the first uranium mine would be at least a few years away due to numerous factors such as market conditions and approval processes. The Westmoreland project was discussed as an example, and it was stated that this is likely to have a staged approach as tenure exists across the NT-Queensland border. Activity in relation to this resource is likely to occur first in Queensland as the largest areas of tenure are there.

(Note: the Committee was later informed by Laramide that the deposit is completely within Queensland and tenure in NT is for exploration/expansion purposes).

Economic development and employment opportunities from uranium

The Traditional Owners made strong representations about enhancing the lives of each community. To achieve this, representatives stated that there needs to be a regional approach, but it was also recognised that there needs to be a consolidated view amongst Traditional Owners. The Traditional Owners also stated that enhancing the community through uranium mining requires opportunities broader than job creation. For example, business opportunities should be provided and general capacity building activities can be undertaken.

Meeting with Gulf Traditional Owner Groups

The Committee held a teleconference with representatives from the Gulf of Carpentaria (Gulf) Communities. This included Traditional Owners from Gangalidda, Garawa, Waanyi PBC, Gkuthaarn, Tagalka, Kukatj and Kurtija.

The Committee provided background on the outcomes of the previous meetings with Traditional Owners including the environmental concerns, health and safety matters and economic development opportunities. The Gulf Community representatives stated that these discussions largely reflect their concerns and desires.

Concerns over environmental impact

The Traditional Owners raised concerns over the environmental impacts of uranium mining and in particular, the waste and disposal of processed uranium. The Committee informed the representatives that there is only one site approved for waste disposal in Australia. Additionally, the purchaser of Queensland's uranium would be required to manage waste or byproducts.

Impacts from uranium mining on cultural heritage sites

An outcome from this meeting was the impact that uranium mines will have on cultural heritage sites. The representatives stated that there should be statutory processes in place to ensure the protection of these sites from uranium mining. The Committee advised that there is existing legislation in place to address these concerns.

Timing of uranium mining activities

Meeting attendees asked about the timing of uranium activities in the region. The Committee advised that the first uranium mine would be at least a few years away due to numerous factors such as market conditions and approval processes.

Employment opportunities

The issue of employment opportunities was raised. The Traditional Owner Groups stated that there should be focus on training and long term outcomes to facilitate continuity of employment.

Meeting with Councils and MMG

The Committee met with local governments to discuss its views on uranium mining and MMG (a resources company) to share its Indigenous employment experience. The local governments that attended included

- Mount Isa City Council,
- Burke Shire Council,
- Doomadgee Aboriginal Shire Council
- Cloncurry Shire Council.

Mount Isa City Council

Mount Isa City Council Mayor, Tony McGrady expressed Council's strong support for uranium mining in Queensland. The nature of uranium mining is similar to other metalliferous mines and impacts are similar in nature. He commended the Queensland Government's decision to overturn the ban, as the economic basis for uranium mining is strong and may deliver strong benefits to regional areas.

The Council believes that the key to developing ongoing support for the uranium industry is effective engagement with Traditional Owners.

MMG presentation

MMG presented information about its experience with the Gulf Communities Agreement, developed in 1997. Overall, MMG considers that the program was successful resulting in strong relationships with the Indigenous community.

MMG believes that the greatest challenge for the uranium industry, from an economic development perspective, is overcoming issues based on Native Title boundaries. Its experience has been such that there can be multiple views adopted by the various Traditional Owners, in direct conflict. Outcomes sought by individual groups may not reflect a broader perspective.

Doomadgee Aboriginal Shire Council

As the relevant Council for the Westmoreland deposit, it expressed concerns over the environmental impacts of uranium mining, including water quality and uranium waste. If uranium mining is to occur, it requires engagement with the community.

Doomadgee Aboriginal Shire Council has also had challenges with Native Title boundaries. There are difficulties for the Mayor to be able to comment on this as that country is not part of his Native Title Group.

Burke Shire Council

The Council informed attendees that it is working with Laramide Resources to ensure opportunities and benefits are realised in the Burke Local Government Area. Councillor Paul Pool advised that no comment would be made on other projects, the views of Traditional Owners or the industry.

However, Councillor Poole advised that the Council was displeased with the outcomes from the Century Mine. It considers that equitable outcomes were not achieved in Burke Shire and regionally. Therefore, any activity that is to occur requires better engagement and input with all Councils to provide opportunities that benefit Burke Shire and other Councils in the region.

From an operational perspective, the Council raised concerns over the water usage associated with uranium mining.

Cloncurry Shire Council

The Council discussed concerns over the cumulative impacts from mining on its transport network and the social costs to deliver local services. It advised that existing mining activity has resulted in significant financial implications for Council to address these issues. The Committee informed the Council that uranium mining is a high value/low volume product which is likely to have minimal impacts on the local infrastructure network.

Meeting with Southern Gulf Catchments, Mount Isa to Townsville Economic Development Zone (MITEZ), Chamber of Commerce

The Committee met with representatives from Southern Gulf Catchments, MITEZ and the Mount Isa Chamber of Commerce.

Mount Isa Chamber of Commerce

The Chamber of Commerce supports economic development activities in the region, including uranium mining. However, the Committee was advised that there needs to be strong education programs undertaken due to the perception issues associated with uranium.

In addition to education, proponents should be obligated to seek local supply of goods and services. The Chamber of Commerce is concerned that local businesses will be excluded from opportunities as proponents often argue that pre-existing contracts are in place with other suppliers. A mechanism needs to be in place to address this and provide local economic opportunities.

Southern Gulf Catchments

Southern Gulf Catchments advised that it does not oppose uranium mining, but like other new mines, environmental issues need to be addressed. The organisation also supported the need for education programs and stated that it should be delivered through local organisations. It would also like to be involved in the approval process to share information it has locally.

MITEZ

MITEZ stated strong support from its members for uranium mining (with the exception of Townsville City Council, which had not finalised its position). Its Council members have an interest in ensuring employment opportunities for local residents.

Meeting with Laramide Resources

The Committee met with Laramide Resources, which is the tenure holder for the Westmoreland deposit.

Westmoreland background

Laramide Resources advised that the deposit contains approximately 50 million pounds of uranium. The Committee enquired how future production will be staged given that tenure exists in Queensland and the NT. Laramide informed the Committee that the known uranium exists completely within Queensland and that tenure in the NT is for exploration purposes.

Laramide stated that prices would need to increase beyond current spot prices for most projects globally to advance to production. The company stated that based on the economics, it is likely to transport uranium through the Barclay Highway and export at existing approved ports (Darwin and Adelaide).

Meeting with Xstrata

Xstrata informed the Committee that it does not currently explore for uranium. Despite this, the recent change in the Queensland Government's policy position may present future commercial opportunities for Xstrata.

Infrastructure and water resource issues

Xstrata stated that existing infrastructure and water resources would be 'stretched' if further mining activities are to occur. Existing infrastructure is nearing capacity and access to water will become increasingly difficult as supplies are already low. It believes that future mining operations require government support to ensure these risks are managed.

Employment opportunities and community engagement

From its experience, the use of a fly-in/fly-out workforce should be avoided. Proponents should undertake transparent consultation and attempt to deliver employment opportunities for local residents.

Uranium Mining Oversight Committee

Suggested Terms of Reference

Objective

The Uranium Mining Oversight Committee (UMOC) is established to oversee the implementation, operations and rehabilitation of the uranium mining industry in Queensland with a focus on delivering best practice and investment certainty.

The Committee will supervise the implementation of the best practice framework for the recommencement of uranium mining, including transport. It will oversee the actions of the industry to ensure compliance with, and promote surpassing, best practice operational and environmental practices and safety standards.

Role

The Committee's role is to facilitate open and transparent discussions between government departments to ensure that the Queensland Government has the information and expertise to oversee the recommencement of the uranium mining industry in Queensland.

Where necessary it should engage outside expertise. The UMOC will oversee the environmental performance and compliance of the uranium mining industry and advise the Queensland Government and other related bodies on best practice solutions across the complete lifecycle of the industry, including tenure approvals, environmental impact assessment and monitoring, production, transport and rehabilitation of all uranium mines in Queensland.

Initial actions:

- Implement the Queensland Government's adopted recommendations for the orderly development of a best practice uranium mining industry, including the engagement of an independent, specialist advisor on environmental performance, monitoring and radiation management issues.
- Support the Uranium Mining Stakeholder Committee (UMSC) to host community forums in regions with known uranium deposits, and facilitate discussions to provide an understanding of community values and concerns, and inform and update the community on the development of the uranium mining industry. This is separate, and in addition to, the required consultation processes within the environmental impact assessment process.

Ongoing actions:

- Advise the Queensland Government on consequential matters from uranium mining and transport including, but not limited to, the regulation of uranium mining and transport, environmental and health and safety safeguards, land use management and community social and economic development.
- Provide advice to the Coordinator-General during the environmental assessment process.

- Monitor and facilitate efficiencies in the assessment process to deliver a streamlined and robust approvals framework for the development of a uranium industry.
- Undertake research and present facts about uranium mining to inform relevant uranium mining stakeholder committees, such as the UMSC.
- Oversee the compliance and performance of uranium mines during operations (including transport) and rehabilitation.
- Inform the UMSC about the environmental performance of uranium mines, including the outcomes of periodic audits of uranium mining sites.
- Review any new guidelines from the Australian Radiation Protection and Nuclear Safety Agency for their applicability to uranium mining, such as the guideline expected in 2013 on the protection of wildlife in natural habitats from the effects of radiation.
- Work with the state government and industry to develop the appropriate communication and education materials on the uranium industry and the associated regulatory framework. This includes developing fact sheets, diagrams and frequently asked questions.

Membership

The Committee is to be chaired by the Director-General of the Department of Natural Resources and Mines, the state agency responsible for administering uranium tenures under the *Mineral Resources Act 1989*. Other Committee members would include:

- Queensland Government representatives from:
 - Department of Environment and Heritage Protection
 - Queensland Health
 - Department of Transport and Main Roads
 - Department of State Development, Infrastructure and Planning
 - Department of Science Information Technology, Innovation and the Arts
 - Department of Aboriginal and Torres Strait Islander and Multicultural Affairs
 - other state government departments as required.
- An independent, authoritative specialist advisor with significant practical experience of uranium mining and its associated environmental and radiation management issues. The UMIC has recommended the Australian Government's Supervising Scientist Division to carry out this role.

Meeting frequency

The Committee should meet at the determination of the Chair, but should initially meet at least four times a year, including at least one meeting in a regional area of Queensland with known uranium deposits.

Uranium Mining Stakeholder Committee

Suggested Terms of Reference

Objective

The Uranium Mining Stakeholder Committee (UMSC) is established to provide an effective forum between community, industry and government representatives to discuss, and resolve where possible, community concerns related to the uranium mining industry. The Committee is to assist with the dissemination of information about uranium and uranium mining to help build community awareness and understanding of the industry.

In addition to legislated and notification periods for public input, community consultation associated with uranium mining proposals should be encouraged as early as possible to facilitate an understanding of community values and concerns and maximise their consideration during assessment and approvals. Consultation should also maximise opportunities for the community to fully understand projects. The UMSC is a key mechanism to facilitate this.

Role

The Committee will be supported by the Uranium Mining Oversight Committee (UMOC) and is to focus on matters specific to regional areas of Queensland with known uranium deposits, including addressing Indigenous and community concerns. The Committee's role is to:

- provide fair and meaningful engagement with the community and build the knowledge and understanding of the uranium industry, economic opportunities and environmental trade-offs
- advise the UMOC on community concerns specific to regional areas of Queensland with known uranium deposits
- provide an opportunity for local community members to discuss their concerns directly with the UMSC
- provide local communities with access to both the project proponent and Queensland Government officials during the uranium mining assessment and approvals process
- inform and educate local landholders about their rights under the land access framework
- inform local communities of opportunities to be consulted and provide input on proposed uranium mine proposal as they become available under the environmental impact assessment process
- receive reports from the UMOC on the uranium mining industry's environmental performance and compliance, including reports from the outcomes of periodic audits of uranium mining sites
- supply facts and information on uranium mining as educational material to local communities.

Membership

Committee members would consist of:

- Queensland Government representatives from the UMOC
- industry representatives
- local government
- Traditional Owner groups
- community representatives
- environment groups
- natural resource management groups.

The Committee should be chaired by the Director-General, Department of Natural Resources and Mines, for its first year, then an independent chair should be appointed by the state government.

Meeting frequency

The Committee must commence, as soon as practical, following the Queensland Government's endorsement of a best practice uranium mining framework. The Committee must run during the exploration, operation and rehabilitation phases of a uranium proposal, so that local communities can be given transparent and detailed information about the activity and performance of the industry. It should meet at least twice a year, including at least one meeting in regional areas of Queensland with known uranium deposits.

Queensland Indigenous Economic Participation Trust (the Trust)

Definition

- The Trust would provide a sustainable and predictable source of funding for projects aimed at addressing the barriers that prevent Indigenous job seekers and businesses from fully participating in Queensland's resources sector and the secondary jobs or business opportunities that are generated by the sector.
- The Trust would be separate from the Queensland Government and include high profile business leaders and local Indigenous people on the board.
- The Trust would be capitalised principally by the Queensland Government, in addition to accepting philanthropic donations. This model recognises the significant investment already being made by industry in the area of Indigenous training, employment and business development.
- The Trust would direct Queensland Government and philanthropic contributions toward projects implemented by the not-for-profit sector in partnership with industry.
- Although industry will not be required to contribute capital to the Trust, projects funded by the Trust will be required to cite either a direct or in-kind contribution from industry. This ensures the Trust's activities would complement, rather than duplicate or substitute, industry's existing employment and training programs, whilst providing incentives for industry to maintain or increase current levels of commitment.
- The Trust would provide certainty of funding to enable the implementation of more strategic, long-term solutions to address barriers to training, employment and business development.
- As the Trust is intended to complement the activities of industry, the Memorandum of Understanding (MOU) on Indigenous employment being negotiated with the Queensland Resources Council (QRC) could identify priorities for the Trust over the next three years. It could also confirm respective roles and responsibilities in training, employment and business development.

Focus

- The focus of the Trust for the first three years would be north west Queensland, with the commencement of uranium mining providing a catalyst for action.
- The Trust would encourage a targeted and coordinated approach to funding, by aligning the funding efforts of the Queensland Government, industry and the not-for-profit sector. The initial focus on north west Queensland would enable an effective regional model to be developed.

Issues to be addressed

- Industry is committed to supporting Indigenous training and employment, but this is not, on its own, enough to get people into and remaining in work.
- Despite the efforts of industry and government, the percentage of Indigenous people employed in mining in north west Queensland fell from 9.9 per cent to 7.5 per cent between 2006 and 2011.
- Industry wants to train and employ more Indigenous people, but gaps in the labour market pipeline mean it is not meeting industry's needs.
- Training and building capacity for business development should also allow Indigenous people to benefit from the secondary job employment and small business opportunities created by a growing resources industry. This includes jobs and small businesses in the services industry.
- At the low-skilled end, there are often social and cultural reasons why people are not equipped for training. Sometimes industry attempts to address these reasons, however the problems may be too big to be effectively addressed by one company, or the social support stops once that company's particular needs are met.
- At the middle-to-higher skilled end, promising Indigenous youth often lack the resources and community support to engage fully with higher-learning opportunities.
- Indigenous businesses, like all businesses, need to achieve a basic level of competency in key aspects of their business (including tendering) before they can engage effectively with industry partnering opportunities.
- While opportunities do exist, the bar is often too high for many Indigenous people and businesses to meet. This has been a key issue raised by the QRC in its negotiations with the Queensland Government for an updated MOU on Indigenous participation in the resources sector.
- There are a large number of not-for-profit organisations already involved in similar activities. The lack of a sustainable and predicable source of funding has precluded the development of coordinated and integrated solutions between government, industry and not-for-profit organisations, which are required to effectively respond to the problem.
- The large number of major resource projects being planned across Queensland¹ is set to increase with the recommencement of uranium mining and other industries in the future. Therefore, capacity building for Indigenous job seekers and businesses needs to start immediately.

¹ Thirty four proposed projects are currently completing environmental impact statements and have been declared 'coordinated projects' under the Coordinator-General.

Draft objectives

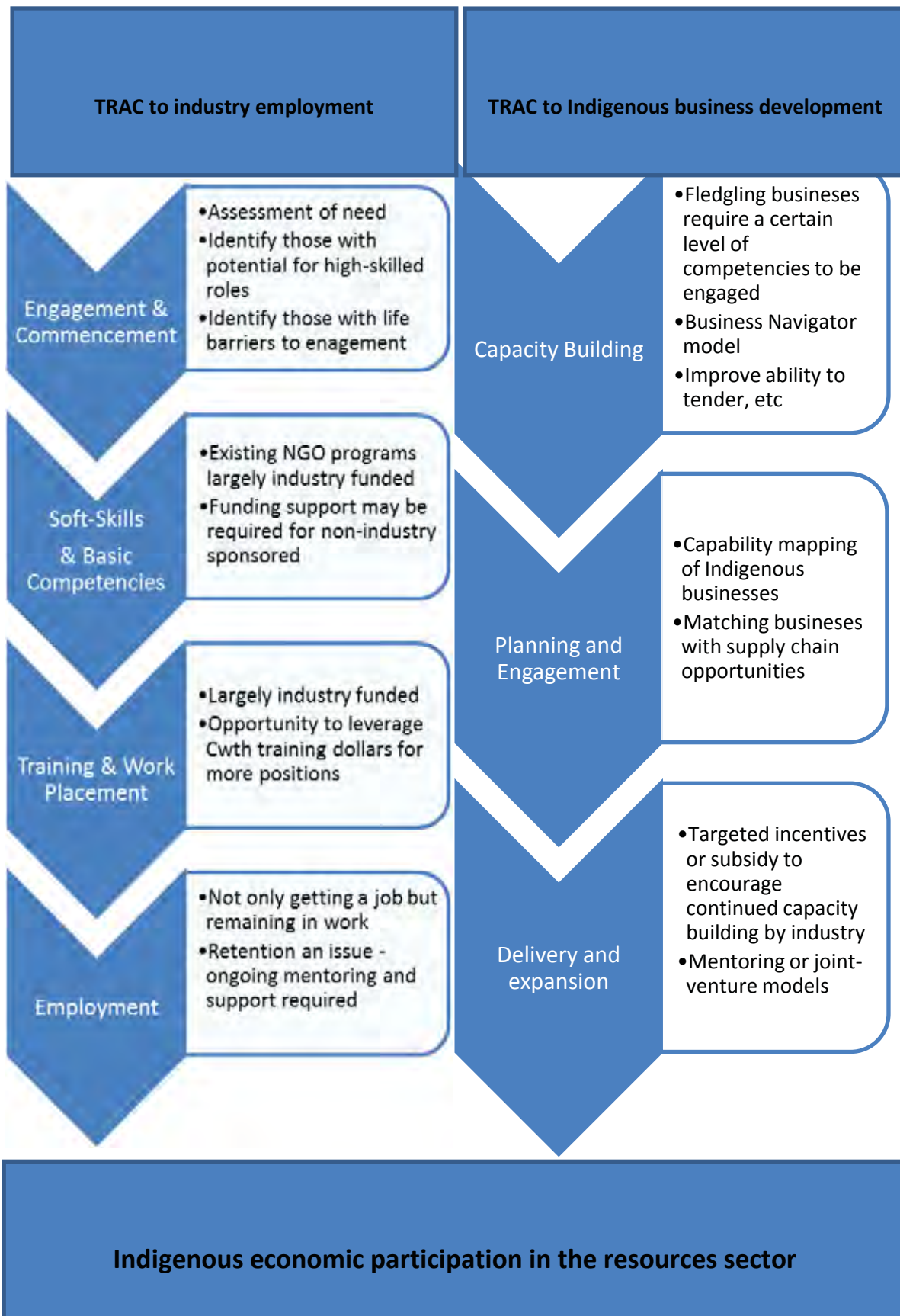
- The objectives of the Trust are to provide a perpetual source of funding for projects that meet these criteria:
 - link Indigenous people with services, training and employment opportunities
 - build the work readiness of Indigenous people to participate in training and employment
 - assist Indigenous people access and undertake tertiary and other accredited training necessary for employment
 - provide mentoring and other cultural case management support to Indigenous people to help improve rates of training completion and employment retention
 - build the capacity of established small-to-medium Indigenous businesses to engage with supply chain opportunities
 - provide training for jobs in the services sector that are created indirectly by growth in the resources sector.
- Funding will be provided for projects that align with an identified opportunity for Indigenous employment or business development relating to the resources sector. The projects should also consider current real or in-kind investment by industry and government, such as employment and/or contracting of Indigenous people on completion of successful training. Projects should not be the role of the Australian Government or local government.

Operation

- The Trust would be overseen by the Public Trustee of Queensland, who has ultimate responsibility for the investment and distribution of foundation funds. An advisory board would be appointed comprising high profile representatives from industry, Indigenous communities and the philanthropic community.
- The Queensland Government would provide an ongoing funding commitment to the Trust. Whatever funding model is ultimately selected, an ongoing commitment is important to establish the credibility of the fund, attract philanthropic donations and ensure a minimum level of predictability of spending.
- The Trust would have dual components—a government pool, and a philanthropic pool. Investments could be made from the government pool independently of the other, with philanthropic dollars serving as a ‘top-up.’ This ensures that the activities supported by the Trust are not contingent on the flow of philanthropic donations (as can be the case when matching dollar-for-dollar or when other similar models are used).

- A Trust Deed would outline the high-level objectives of the Trust. These objectives would be drafted to ensure an appropriate balance of prescriptiveness and flexibility, and to meet the criteria of the Australian Tax Office associated with 'deductible gift recipient 1' status.
- The terms of the Trust Deed would be drafted to ensure investments from the Trust complement existing levels of investment by industry in training, employment, workforce development and retention and business establishment and/or development.
- The scope of the Trust's activities must also be designed so as not to supplant investments by industry in areas such as training and workforce development. Otherwise there may be reluctance to donate to projects perceived to be the responsibility of the mining industry.
- Projects would be delivered by the not-for-profit sector in partnership with industry and the local community. Projects could be by tender in response to an identified need, or initiated by application. Recipient organisations would need to demonstrate the expected economic participation benefits from the project, and the industry contribution (this could be in-kind, for example training costs or the remuneration value of the jobs on offer at the end).
- Funding recipients should also demonstrate successful outcomes, such as meeting target levels for job placement and employee retention, in order to qualify for secondary/final grants.
- It would be a Trust for all Indigenous members of the community. Private Traditional Owner dealings with industry through Indigenous Land Use Agreements and/or cultural heritage management plan negotiations would remain separate.
- The specific projects undertaken would depend on community and industry needs, and would be undertaken in accordance with the Australian Tax Office's conditions for tax deductibility. Examples of the types of projects it could potentially fund include:
 - A scholarship program for promising Indigenous students to achieve qualifications for projected higher-skilled roles, with a guaranteed job at the end.
 - Targeted programs within schools to promote early awareness of the mining industry and the opportunities it provides to Indigenous students.
 - Employment brokers, who could work with industry to identify job opportunities, potential Indigenous candidates and work with them to develop training solutions tailored for their needs and help overcome any barriers to employment.
 - Funding for not-for-profit organisations to deliver tailored non-vocational training to better prepare Indigenous job seekers for industry training, or training for indirect job opportunities in the services sector.

- A devolved grants scheme to help those who have demonstrated a commitment to working to overcome the barriers to completing training (for example licencing or temporary rental assistance).
- Indigenous mentors, who can develop relationships with Indigenous employees and help them work through issues preventing them staying in work.



Land access and Indigenous land rights Additional information

Land access

As discussed in Chapter 3, Queensland land access laws set the framework for a staged process that resource companies must follow in order to access and undertake activities on private land.

A key objective of the land access laws is to provide a uniform process for all resource tenure holders, with the exception of mining leases. The Committee understands that these laws were reviewed in early 2012 by an independent panel that consulted with stakeholders who had direct experience with land access. The panel's report, dated February 2012, provided 12 recommendations to the Queensland Government and outlined what is termed the 'optimal process', a stepped process for best practice land access arrangements.

The Queensland Government has responded to this report and committed to a six point action plan which sets out a series of actions for both government and stakeholders to improve the land access process. As actions are already underway to refine the land access framework, and as it is understood that exploration for uranium is like exploring for any other mineral, it is considered that no additional actions are required specifically for uranium.

Indigenous land rights and heritage

Chapter 8 of this report discusses specific issues relating to Indigenous interests and uranium mining activity, and presents specific recommendations in this context. One of the important and required steps in the assessment and approval process for a uranium mining proposal is meeting statutory Native Title and cultural heritage requirements. The Committee believes the Queensland Government should not differentiate uranium from other significant resource projects in the application of current statutory processes related to Native Title and cultural heritage.

Native Title and mining tenures

As discussed in Chapter 3, Native Title is defined as the rights and interests that are possessed under the traditional laws and customs of Aboriginal and Torres Strait Islander peoples, and that are recognised by common law. In some areas, Native Title has been deemed to be extinguished, such as on freehold land, but in other areas Native Title may continue to exist. When making an application for a resource permit, the applicant must undertake searches to determine if the permit area is subject to Native Title.

The Federal *Native Title Act 1993* (NT Act) is the primary piece of legislation protecting the Native Title rights and interests of Aboriginal and Torres Strait Islander people and the overarching legislation that governs the relationship between mining companies and Indigenous communities in Australia.

Native Title rights and interests may include rights to:

- live on the area
- access the area for traditional purposes, such as camping or conducting ceremonies
- visit and protect important places and sites

- hunt, fish and gather food or traditional resources such as water, wood and ochre
- teach law and custom on country.

If Native Title is determined, the holder of Native Title may be granted the same or different rights as landowners depending on whether the determination confers 'exclusive' or 'non-exclusive' Native Title rights and interests.

Not all land in Australia is subject to Native Title. There are sections within the NT Act that outline types of tenures that have extinguished the existence of Native Title, such as freehold land. Even though on a map a claim area may overlap a particular parcel of land, it is not guaranteed that Native Title is extended to that area.

In Queensland, the NT Act prescribes the processes and procedures which must be followed in order for the state to validly grant mining or exploration tenure over 'non-exclusive' land. Such grants are defined in the NT Act as 'future acts' creating a 'right to mine' which may affect Native Title rights and interests. Non-exclusive land is land where Native Title has not been extinguished and may still exist. The majority of land in the North West Minerals Province is non-exclusive land.

The states and territories

In addition to the NT Act, state and territory laws also impact on the activities of mining companies. These laws relate primarily to land rights and the identification and protection of cultural heritage.

In Queensland, the *Aboriginal Land Act 1991* and the *Torres Strait Islander Land Act 1991* provide for a system of community level land trusts under a special form of title called a Deed of Grant in Trust (DOGIT). The *Mineral Resources Act 1989* requires applicants for mining and exploration tenures to seek the views of the trustees of Aboriginal reserves. Any tenure grant over DOGIT land must be affected by the Governor-in-Council, having due regard to the views of the Trustee. Any negative views usually result in a negotiated agreement between the parties.

The provisions of the *Aboriginal Cultural Heritage Act 2003* (Qld) (ACH Act) apply to all persons and all land in Queensland, including freehold. The ACH Act provides for a duty of care and protocols for identifying, protecting and managing Indigenous cultural heritage. This duty of care is incumbent upon proponents for all types of developments affecting land, not just mining. For larger projects, this usually results in the negotiation of a cultural heritage management plan, and for projects subject to an EIS, this is mandatory.

In South Australia, there are three main acts that provide for a form of Aboriginal freehold title and impose strict conditions on land access. These are the *Aboriginal Lands Trust Act 1966*, the *Anangu Pitjantjatjara Yankunytjatjara Land Rights Act 1981* and the *Maralinga Tjarutja Land Rights Act 1984*. South Australia was the first state to pass land rights legislation.

In the Northern Territory, the *Aboriginal Land Rights (Northern Territory) Act 1976* (ALR Act) is the primary piece of legislation. Under its provisions, Aboriginal land trusts have been established to hold Aboriginal freehold title over two categories of land—former reserves and lands approved for transfer by the federal Minister. The ALR Act sets out the processes for negotiation of exploration and mining agreements. The statutory land council negotiates mining and exploration applications on behalf of Traditional Owners. Under the terms of the ALR Act, the applicant for a mining interest must apply to the relevant minister and to the land council for consent.

In New South Wales, the *Aboriginal Land Rights Act 1983* (NSW) provides an Aboriginal land title, grants of land and procedures for obtaining access to and use of land.

Institutional environment

The mining industry comes into contact with a range of institutions with responsibilities including:

- Native Title Representative Bodies (NTRB)
- statutory land councils
- Prescribed Bodies Corporate
- Community Councils
- Aboriginal townships
- National Native Title Tribunal (NNTT)
- cultural heritage bodies

Mining and Native Title in Queensland

Pursuant to the NTA, the granting of a mining permit for exploration or production purposes (mining lease), over land that is subject to Native Title, is classified as a “right to mine”. A right to mine is a form of ‘future act’ and this subset of a future act is given an additional avenue to engage with the relevant Native Title parties. This is the Right to Negotiate (RTN) process.

All future acts trigger the obligation to address potential impacts on Native Title rights and interests and there are a variety of options available, pursuant to the NT Act that an Applicant can undertake. The processes available vary depending on the type of permit, the works to be undertaken and the area of land that is subject to Native Title.

In Queensland, if there is land subject to Native Title in the permit area, the applicant will be asked to nominate a preferred Native Title process. Several options are available to tenure applicants to deal with Native Title issues associated with applications for mining and exploration tenements under the MR Act and the *Petroleum and Gas (Production and Safety) Act 2004*. These procedures are prescribed by the *Federal Native Title Act 1993*. The most commonly used processes are:

1. Right to Negotiate procedures (RTNs).
2. The expedited procedure with attaching Native Title protection conditions (NTPC's), for exploration tenures only.
3. Indigenous Land Use Agreements (ILUAs) under the NT Act.
4. Alternative state provisions (ASPs) under the MR Act, repealed in 2003.

These procedures apply to all new applications for mining and exploration tenures over non-exclusive land where Native Title may exist, or has been determined to exist. In some circumstances, these procedures may also apply to some other future acts such as renewals of tenures, addition of previously excluded land, or addition of minerals to a tenure.

The type or scale of the proposed activity has no bearing on the process or protocols used. The same legislated Native Title requirements apply whether the tenure is a small scale gemstone mining claim or a ‘state significant’ oil, gas, coal, gold or copper project. The relevant and applicable Native Title process will not be any different for a mining lease proposing to mine uranium.

The Queensland Department of Natural Resources and Mines (DNRM) coordinates these processes for future acts involving creating or increasing a right to mine. DNRM liaises with industry, Native Title claimants and holders as well as representative bodies to facilitate and expedite the grant of exploration and mining tenures that are subject to the provisions of the NT Act and to promote resource development across the state.

There are currently 29 mining leases (ML) in Queensland which list uranium as a mineral and were granted at a time that predate any Native Title requirement. The majority of these include uranium as one of several minerals attaching to the lease. Uranium is not the primary target of these MLs. Most are small in area and appear speculative. The addition of the mineral uranium to any other currently granted ML may trigger a Native Title process, depending on the background land type and current operations for the lease.

Right to Negotiate (RTN)

The RTN process is normally used by an individual applicant for one or several of the applicant's own tenures, and can be initiated for either mining or exploration tenures or a combination of both. It requires the tenure applicant to provide the state (through DNRM) with a submission requesting that the RTN process be commenced. The state then advertises its intention to grant the tenure using a notice pursuant to section 29 of the NT Act.

Put simply, the applicant then negotiates with the Native Title party with a view to achieving an agreement on how to manage the effects of the proposed operation on Native Title rights and interests, and what compensation or consideration might be applicable. This is called an 'ancillary agreement'.

Once the terms of the ancillary agreement are decided and the agreement signed, the parties then sign a 'deed' pursuant to section 31 of the NT Act, in which the parties warrant that they have reached agreement about the management of Native Title rights and interests, and agree to the grant of the tenure. The state is a party to the section 31 deed. The state is not usually a party to the ancillary agreement.

The NT Act prescribes a six month negotiation period for the RTN process. If after six months the parties are not able to reach agreement, either party may refer the matter to the NNTT for a future act determination. The NNTT may make a ruling that the future act can or cannot be done. The NNTT may also initiate mediation prior to making a determination.

Expedited procedure/Native Title protection conditions

The expedited procedure under section 32 the NT Act may be applied to a future act if the state, through public notification, asserts that the doing of the act, that is, the grant of an exploration tenure, is one which is unlikely to adversely affect Native Title rights and interests.

The state is able to make such an assertion because it proposes to attach the Native title protection conditions (NTPCs) to the tenure upon grant. The NTPCs provide for a system of notifications and inspections designed to protect and manage Native Title interests and cultural heritage.

As part of the initial notification and advertising process, a Native Title party may lodge an objection to use of the expedited procedures. This usually results in both parties negotiating an agreement which better suits the parties. If agreement is not reached, any

remaining objection will be heard by the NNTT, which will then rule that the grant may or may not be done. The expedited procedure can only be applied to exploration tenures that do not cause major ground disturbance (i.e. bulk sampling). The expedited procedure process cannot be used for mining tenures.

Indigenous Land Use Agreements (ILUA)

The NT Act provides for Indigenous Land Use Agreements (ILUAs) to be made between Native Title holders or claimants and other interested parties about how land and waters in the area covered by the agreement will be used and managed in the future.

ILUAs are supported by the Queensland Government, which is committed to resolving Native Title requirements through negotiation rather than litigation. Once an ILUA is authorised by the Native Title parties, then signed by all parties, it is lodged with the NNTT for registration. The registration may take up to six months which includes a three month notification period. After the ILUA is registered, the authorised future acts may then proceed.

Importantly, once an ILUA is registered with the NNTT it has the same status as a legal contract binding all Native Title parties to the terms of the agreement. This includes those who may not have been identified at the time the agreement was made, providing everyone with the certainty and security they need.

Private Indigenous land use agreements

ILUAs are very flexible and the agreement can encompass a broad range of considerations. The NT Act is not prescriptive on what can be included in an ILUA. An important clause for an applicant would be the sections providing the Native Title party's consent to possible future acts, such as future production permits, infrastructure or pipelines. These clauses need to be worded carefully to ensure that they capture the Native Title party's consent. Legal advice should be sought by all parties in respect of proposed ILUA terms and conditions.

Whilst there are no restrictions, ILUAs may include:

- monetary compensation (lump sum, distributed or royalties)
- employment and training provisions
- Indigenous cultural heritage components
- contracting opportunities
- environmental preservation and rehabilitation.

There are three types of ILUAs:

- body corporate agreements (where there is a registered Native Title holder for the area)
- area agreements (where there is no determined holder, but claimants)
- alternative procedure agreement (which can be used for large scale areas).

In relation to mining permits, the state is not a party to the agreement and has no involvement with the negotiation process. However, officers of the DNRM Native Title Services Unit regularly assist all parties when requested and often attend negotiation meetings in order to provide advice on tenure processes, applicable legislation and appropriate protocols.

The applicant is solely responsible for addressing the advertising requirements and organising negotiation meetings for an ILUA process. However, the applicant is required to provide regular updates to the state on the progress of its ILUA negotiations.

** Tenure applicants needing to go through either a RTN or ILUA process for a large scale mining project should be aware that they are likely to incur significant expenses associated with multiple meetings. These can include venue hire and catering costs, transport, accommodation, incidental expenses and daily 'sitting fees' for Traditional Owners, and agreed legal fees incurred by Traditional Owners or their representative bodies.

Things to consider about private ILUAs:

- ILUAs can incorporate many future acts and larger scale operations not just single tenements
- there is no time limit on negotiations - if an agreement is not reached there is no opportunity for referral to the NNTT
- ILUA negotiations can be commenced at anytime - there is no requirement to initiate the process through the state
- as there are no legislative timeframes on negotiations, parties should be aware that there is no guaranteed outcome.

Assistance can be sought from the NNTT under section 24CF of the NT Act to reach an agreement. However, the role of the NNTT is discretionary rather than mandatory like the RTN process.

ILUA timeframes are generally driven by the engagement and commitment of the Native Title parties and the applicant. Most private ILUAs take, on average, 12-18 months for an agreement to be lodged with the NNTT and a further six months for the registration. As there is no opportunity to refer the matter to the NNTT under an ILUA arrangement, some applicants elect to initiate a RTN process while negotiations are aimed at achieving an ILUA as the final outcome.

Land and resource activity

The Native Title Unit within DNRM provides information, advice and services to parties seeking to undertake exploration, mining and other land and resource activities on land affected by Native Title. The Aboriginal and Torres Strait Islander Legal Service is currently updating the Native Title Work Procedures published in 1998 to reflect current law and policy.

The online GIS Mapping systems will provide a preliminary indication on the extent of any intersect with land where Native Title rights may exist. Where the area does intersect with Native Title rights and interests, the application will have to address these rights pursuant to the NT Act.

Glossary

Class 7 Dangerous Goods	Dangerous goods are assigned to classes, divisions and categories in accordance with the Australian Code for the Transport of Dangerous goods by Road and Rail. Class 7 refers to radioactive material.
Coordinator-General	In accordance with the <i>State Development and Public Works Organisation Act 1971</i> , the Coordinator-General has wide ranging powers to plan, deliver and coordinate large-scale projects. The Coordinator-General's role has evolved from being concentrated solely on public works to being principally focused on facilitating and regulating private sector infrastructure projects.
Environmental impact assessment (EIA)	The environmental impact assessment (EIA) is the process in which environmental management is integrated into planning for development proposals. The International Association of Impact Assessment (1999) defines EIA as "the process of identifying, evaluating and mitigating the biophysical, social, and other relevant effects of development proposals prior to major decisions being taken and commitments made".
Environment	Environment as defined in Section 8 of the <i>Environmental Protection Act 1994</i> includes: (a) ecosystems and their constituent parts, including people and communities (b) all natural and physical resources (c) the qualities and characteristics of locations, places and areas, however large or small, that contribute to their biological diversity and integrity, intrinsic or attributed scientific value or interest, amenity, harmony and sense of community (d) the social, economic, aesthetic and cultural conditions that affect, or are affected by, things mentioned in paragraphs (a) to (c).
Exploration	An activity in which a resource company or organisation searches for resources. This can include carrying out detailed geological and geophysical surveys, followed up where appropriate by drilling and other evaluation techniques.
Exploration permit (EP)	An exploration permit is the tenure permit that allows the tenure holder to carry out exploration activities within the boundary of the tenure to determine what minerals exist, the quality and quantity. Exploration permits are issued under the <i>Mineral Resources Act 1989</i> and cover any minerals in or under land, or in the water or sea above the land.
Exploration permit: minerals (EPM)	An exploration permit for all minerals other than coal.
Financial assurance	Financial assurance is paid by the resource company and held by government as a security to ensure compliance with the conditions of an environmental authority. The financial assurance will meet any costs or expenses incurred by the administering authority in taking action to prevent or minimise environmental harm or rehabilitate or restore the environment in relation to the activity for which financial assurance has been given.

Guide to Safe Transport of Uranium Oxide Concentrate	An Australian Government guide that is consistent with legislation and codes of practice. The guide consolidates a range of best practice advice and procedures widely applied across the transport sector in handling uranium oxide concentrate, such as the IAEA Safety Standard – Fundamental Safety Principles SF-1.
Heap leaching	An extraction process by which chemicals (usually sulphuric acid) are used to extract the economic element from ore that has been mined and placed in piles on the surface.
In-situ recovery (ISR)	The recovery of minerals by chemical leaching instead of excavation. Also known as solution mining. A process using a solution called lixiviant to extract uranium from underground ore bodies. Lixiviant, which typically contains an oxidant such as acid (sulphuric acid or less commonly nitric acid) or carbonate (sodium bicarbonate, ammonium carbonate, or dissolved carbon dioxide), is injected through wells into the ore body in a confined aquifer to dissolve the uranium. This solution is then pumped via other wells to the surface for processing.
Joint Ore Reserves Committee (JORC) Code	The Australasian Code for Reporting for Exploration Results, Mineral Resources and Ore Reserves, prepared by the JORC. It is a principle based code which sets out recommended minimum standards and guidelines on classification and public reporting in Australasia. Companies listed on the Australian Securities Exchange are required to report exploration outcomes, resources and reserves in accordance with the JORC Code standards and guidelines.
Leaching	The extraction process where chemicals (usually sulphuric acid) are used to extract the economic element from ore which has been mined. Leaching may be carried out in heaps by piling ore on thick plastic (usually HDPE or LLDPE), spraying the leaching agent over the pile (recirculating the leaching agent for 30 to 90 days) and collecting the leachate for further processing. Alternatively, the ore may be leached in a mill in leaching tanks whereby the crushed ore is mixed with water to form slurry and is then mixed with the leaching agent.
Milling	Grinding ore into fine particles prior to further processing.
Mining lease (ML)	A mining lease permits the lease holder to mine within the boundary of the tenure. The lease can include open-cut or underground mining, the minerals specified to be mined and carry out activities associated with mining or promoting the activity of mining.
Native Title	Defined as the rights and interests that are possessed under the traditional laws and customs of Indigenous peoples. The <i>Commonwealth Native Title Act 1993</i> is the primary piece of legislation protecting the Native Title rights and interests of Indigenous people and the overarching legislation that governs the relationship between mining companies and Indigenous communities in Australia.
North West Minerals Province	A Queensland region, known for enriched minerals, centred on Mt Isa and west of Townsville.
Ore	An ore is a type of rock that contains minerals with important elements including metals. The ores are extracted through mining. These are then refined to extract the valuable element(s).

Outcome-based conditions	Environmental conditions which are focussed on achieving positive environmental outcomes rather than specific prescriptive measures.
Radioactive material	Radioactive material is any material designated in national law, regulation or by a regulatory body as being subject to regulatory control because of its radioactivity.
Radionuclide	An atom with an unstable nucleus which is susceptible to disintegration and the release of radiation (e.g. gamma rays) and subatomic particles (e.g. alpha and beta particles).
Resources	A concentration of naturally occurring solid, liquid or gaseous materials in or on the Earth's crust in such form and amount that its economic exploitation is currently or potentially feasible.
Resources acts	Incorporates a suite of Queensland's legislation associated with the resources industry. This includes: <i>Mineral Resources Act 1989</i> , <i>Petroleum and Gas (Production and Safety) Act 2004</i> , <i>Petroleum Act 1923</i> , <i>Greenhouse Gas Storage Act 2009</i> , <i>Geothermal Energy Act 2010</i> .
State ILUA	A state ILUA is one that has been negotiated between the state, mining representative bodies, Land Councils and Traditional Owners of the land. Applicants who satisfy the eligibility criteria of the ILUA can deed into the state ILUA, which contains previously negotiated conditions designed to address Native Title requirements. The state ILUA is registered with the Native Title Tribunal and binds the permit holder and the state to the conditions within the agreement.
Tailings	The fine material left after the economic element from the ore has been removed by crushing and grinding the ore, followed by leaching. Uranium tailings may contain a wide variety of contaminants including leaching agent (e.g. sulphuric acid), heavy metals that were not extracted in the leaching process, sulphides and other materials from the ore body. Low grade waste rock which could give rise to acid mine drainage is sometimes also encapsulated with tailings in the tailings repository.
Transport code	Under the National Directory for Radiation Protection, as agreed to by the Australian, state and territory governments, Australian regulators must, in their regulatory framework, adopt RPS 2 - Code of Practice for the Safe Transport of Radioactive Material.
Transport plan	A mandatory plan that transporters of uranium oxide submit to Australian Safeguards and Non-Proliferation Office. Transport plans can be a single plan, detailing all the stages of the transport process (transportation from mine site, to storage site, to port, to overseas country), or can comprise individual transport plans for each stage of the transport process.
Uranium deposits	Areas of known uranium mineralisation.
Uranium oxide	The transportable product of uranium processing. This is also known as yellowcake, U ³ O ⁸ and uranium oxide concentrates (UOC). See Chapter 2 for more information.
Uranium spot price	The price quoted for the sale of uranium, which is not covered by an ongoing contract

Acronyms

ABARE	Australia Bureau of Agricultural and Resources Economics
ACHA	<i>Aboriginal Cultural Heritage Act 2003 (Qld)</i>
AMSA	Australian Maritime Safety Authority
ARPANSA	Australian Radiation Protection and Nuclear Safety Agency
ASNO	Australian Safeguards and Non-Proliferation Office
AUA	Australian Uranium Association
DNRM	Department of Natural Resources and Mines (QLD)
DRET	Department of Resources, Energy and Tourism (Cwlth)
DTMR	Department of Transport and Main Roads (QLD)
EHP	Department of Environment and Heritage Protection (QLD)
EP Act	<i>Environmental Protection Act 1994</i>
EPBC Act	<i>Environment Protection and Biodiversity Conversation Act 1999 (Cwlth)</i>
IAEA	International Atomic Energy Agency
ICRP	International Commission on Radiological Protection
ILUA	Indigenous Land Use Agreement
MOU	Memorandum of Understanding
MQSH Act	<i>Mining and Quarrying Safety and Health Act 1999 (QLD)</i>
NORM	Naturally occurring radioactive material
OCG	Office of the Coordinator-General
UOC	Uranium oxide concentrates
QH	Queensland Health
QH-RH	Queensland Health, Radiation Health Unit
QRC	Queensland Resources Council
R4R	Royalties for Regions initiative
SDPWO Act	<i>State Development and Public Works Organisation Act 1971</i>
SEWPaC	Department of Sustainability, Environment, Water, Population and Communities
SSD	Supervising Scientist Division

REFERENCES

- Argonne National Laboratory, 2005, *Uranium: Human Health Fact Sheet*, Argonne National Laboratory, <<http://www.evns.anl.gov/pub/doc/Uranium.pdf>>.
- ARPANSA, 2008, *Safe Transport of Radioactive Material (2008 Edition)*, <http://www.arpansa.gov.au/pubs/rps/rps2_2008.pdf>.
- Australian Safeguards and Non-Proliferation Office, 2012, *Annual Report 2011–12*, Australian Government, Canberra.
- Australian Transport Safety Bureau, 2011, *Derailment of freight train 7AD1*, Australian Government, Canberra.
- Australian Uranium Association, 2011, *Water use in uranium mining*, <<http://www.auran.org.au/> on 7 January 2013>.
- BHP Billiton, 2009, *Olympic Dam Project: Draft EIS*, <<http://www.bhpbilliton.com/home/aboutus/regulatory/Documents/odxEisAppendixQ8SocialImpactsAndLessonsFromOtherMiningDevelopments.pdf>>.
- COAG, 2007, *Best Practice Regulation: A Guide for Ministerial Councils and National Standard Setting Bodies*, <http://www.finance.gov.au/obpr/docs/COAG_best_practice_guide_2007.pdf>.
- Commonwealth of Australia, 2010, *Australia's In Situ Recovery Uranium Mining Best Practice. Commonwealth of Australia*, <<http://www.ret.gov.au/resources/documents/mining/uranium/in-situ-uranium.pdf> on 7 January 2013>.
- Deloitte, 2008, *Review of Regulatory Efficiency in Uranium Mining*, Deloitte, final report, DTT, Melbourne.
- Department of Environment and Heritage Protection, 2012a, *Department of Environment and Heritage Protection: Regulatory Strategy*, Department of Environment and Heritage Protection, Brisbane.
- Department of Environment and Heritage Protection, 2012b, *Procedural Guide – Writing Effective and Enforceable Conditions*, Department of Environment and Heritage Protection, Brisbane.
- Department of Environment and Heritage Protection, 2012c, *2011-12 Annual Report*, The State of Queensland (Department of Environment and Heritage Protection), Brisbane,
- Department of Environment and Heritage Protection, 2012d, *Guideline – Model Mining Conditions*, Department of Environment and Heritage Protection, Brisbane.
- Department of Environment and Heritage Protection, 2012e, *Guideline – Model Water Conditions for Coal Mines in the Fitzroy Basin*, <<http://www.ehp.qld.gov.au/land/mining/pdf/model-water-conditions-mining-fitzroy-em288.pdf>>.
- Department of Environment and Heritage Protection, 2012f, *Guideline – Preparation of water management plans for mining activities*, <<http://www.ehp.qld.gov.au/land/mining/pdf/gl-bi-water-management-plan-em324.pdf>>.

Department of Environment and Heritage Protection, 2012g, *Guideline – preparing a plan of operations and audit statement for level 1 mining projects*, <<http://www.ehp.qld.gov.au/land/mining/pdf/prep-plan-ops-level1-mining-em583.pdf>>.

Department of Environment and Heritage Protection, 2012h, *Guideline – Rehabilitation requirements for mining projects*, <<http://www.ehp.qld.gov.au/land/mining/pdf/guide-rehab-requirements-mining-em1122.pdf>>.

Department of Environment and Heritage Protection, 2012i, *Guideline – Calculating financial assurance for mining projects*, <<http://www.ehp.qld.gov.au/land/mining/pdf/financial-assurance-mining-em585.pdf>>.

Department of Environment and Heritage Protection, 2012j, *Guideline – Final and progressive rehabilitation reports and audit statements for level 1 mining lease projects*, <<http://www.ehp.qld.gov.au/land/mining/pdf/guide-final-rehab-report-level1-mining-em610.pdf>>.

Department of Environment and Heritage Protection, 2012k, *Guideline – Final and progressive rehabilitation reports and audit statements for level 1 exploration and mineral development projects*, <<http://www.ehp.qld.gov.au/land/mining/pdf/gl-mi-frr-eas-level1-exp-min-dev-em603.pdf>>.

Department of Environment and Heritage Protection, 2012l, *Information sheet – Financial assurance*, <<http://www.ehp.qld.gov.au/land/mining/pdf/is-mi-financial-assurance-em598.pdf>>.

Department of Manufacturing, Innovation, Trade, Resources and Energy (SA), 2012, *South Australia's Major Operating/Approved Mines, Resource Estimates and Annual Production*, <http://outernode.pir.sa.gov.au/__data/assets/pdf_file/0005/157793/000_resourcetable_october_min es.pdf>.

Department of the Premier and Cabinet (Qld), 2013, *January – June 2013 6 Month Action Plan*, <<http://www.thepremier.qld.gov.au/plans-and-progress/plans/assets/6-month-action-plan-jan-jun-13.pdf>>.

Department of Regional Development and Lands, 2011, *Royalties for Regions – Giving back to WA communities*, Government of Western Australia, Western Australia.

Department of State Development, nd, *Project Approvals Overview*, <<http://www.dsd.wa.gov.au/6734.aspx>>.

Doering, C, 2010, *Environmental protection: Development of an Australian approach for assessing effects of ionising radiation on non-human species*, Technical Report Series No. 154, Commonwealth of Australia, Yallambie.

Government of Saskatchewan, 2013a, *Saskatchewan: Energy Rich. Resources Full*, <<http://www.er.gov.sk.ca/Fact-Sheets>>.

Government of Saskatchewan, 2013b, *Guidelines for the preparation of the terms of reference*, <<http://www.environment.gov.sk.ca/EATermsOfReferenceGuidelines>>.

Government of Saskatchewan, 2013c, *Environmental assessment in Saskatchewan*, <<http://www.environment.gov.sk.ca/EnvironmentalAssessmentProcessGuideline>>.

Johnston, P, 2012, *Letter to Council Paul Bell Re: Recommencement of uranium mining in Queensland*.

Heathgate, 2013, *Beverley Mine*, <<http://www.heathgate.com.au/thebeverleymine.html>>.

HRSCIR, 2006, *Australia's Uranium – Greenhouse Friendly Fuel for a Energy Hungry World*, House of Representatives Standing Committee on Industry and Resources, Canberra.

Hujo, K, 2012, *Mineral Rents and the Financing of Social Policy: Opportunities and Challenges*, Palgrave Macmillan, United Kingdom.

Idaho State University, nd, *Radioactivity in Nature*, Idaho State University, <<http://www.physics.isu.edu/radinf/natural.htm>>.

International Atomic Energy Agency, 2009, *Establishment of Uranium Mining and Processing Operations in the Context of Sustainable Development*, <http://www-pub.iaea.org/MTCD/publications/PDF/Pub1401_web.pdf>.

Lottermoser, B.G, 2011, *Colonisation of the rehabilitated Mary Kathleen uranium mine site (Australia) by Calotropis procera: Toxicity risk to grazing animals*. *Journal of Geochemical Exploration* 111: 39-46.

Lottermoser, B.G & P.M. Ashley, 2005, *Tailings dam seepage at the rehabilitated Mary Kathleen uranium mine*, Australia. *Journal of Geochemical Exploration* 85: 119-137.

Lottermoser, B.G, P.M. Ashley & M.T. Costelloe, 2005, *Contaminant dispersion at the rehabilitated Mary Kathleen uranium mine*, Australia. *Environmental Geology* 48: 748-761.

Mudd, G, 1998, *An Environmental Critique of In Situ Leach Mining: The Case Against Uranium Solution Mining*, <<http://users.monash.edu.au/~gmudd/files/1998-07-InSituLeach-UMining.pdf>>.

McKay, A.D & Miezitis, Y, 2001, *Australia's uranium resources, geology and development of deposits*, Mineral Resource Report 1, AGSO – Geoscience Australia, Canberra.

Nuclear Energy Agency, OECD, 2005. *The safety of the nuclear fuel cycle*. OECD Publishing, Paris.

PWC, 2011, *Mine 2011: The game has changed*, <http://www.pwc.com/en_GX/gx/mining/pdf/mine-2011-game-has-changed.pdf>.

Queensland Health, 2009, *Radiation Protection Programme for the Transport of Radioactive Materials*, <<http://www.health.qld.gov.au/radiationhealth/documents/rptransport.pdf>>.

Queensland Health, 2011, *Transport Licence Information*, <www.health.qld.gov.au/radiationhealth/transport.asp>.

Queensland Resources Council, 2012, *Submission to the Uranium Mining Implementation Committee*, Queensland Resources Council, Brisbane.

Schmidt, P, 2010, *Rehabilitation of former uranium mining and millings sites in Germany (WISMUT sites) – a health and physicists perspective – 10091*, <<http://www.wmsym.org/app/2010cd/wm2010/pdfs/10091.pdf>>.

USCER, 2012, *The Development, Export Performance and Challenges of the Australian Uranium Industry*, Uranium Council for the Standing Council on Energy and Resources.

Uranium Advisory Group, 2012, *Independent Review of Uranium Mining Regulation*, Western Australian Department of Mines and Petroleum, Western Australia.

World Nuclear Transport Institute, 2012, *The IAEA Regulations for the Safe Transport of Radioactive Materials*, <www.wnti.co.uk/nuclear-transport-facts/regulations.aspx>.

