australian uranium association

Best practice guidelines for uranium exploration

December 2009
1. PREAMBLE

1.1 Principles of Uranium Stewardship

The Australian uranium industry is committed to working cooperatively to ensure uranium exploration and mining are managed in a safe, environmentally, economically and socially responsible manner.

That commitment is manifested in the Australian Uranium Association’s *Principles of Uranium Stewardship*, which reflect and are consistent with the global principles developed under the auspices of the World Nuclear Association.

The Association’s *Principles* are additional to the broader Australian minerals industry’s commitment to sustainable development as outlined in the Minerals Council of Australia’s *Enduring Value*; and to the Australian Uranium Association’s *Charter* and *Code of Practice*.

Through the *Principles*, the Australian uranium industry aims to engage the public and earn trust for the exploration, mining and export of uranium.

The *Principles* are:

1. The safe and peaceful use of nuclear technology
2. Continual improvement of our quality, health, safety, security and environmental performance to minimise the impacts of our activities on people and the environment
3. Contributing to social and economic development of the communities where we operate
4. Recognition of fundamental human rights
5. Open, honest and transparent communication
6. Operating ethically with sound corporate governance
7. Sharing knowledge to encourage widespread adoption of best practices
8. Acting responsibly in the areas that we manage and control, and share our concern in other sectors of the nuclear fuel cycle
9. Providing responsible sourcing, use and management of uranium and all its by-products
10. As an industry, regularly communicating progress on the implementation of the principles to our stakeholders and review and update them as necessary
1.2 The Code of Practice

The Australian Uranium Association’s *Code of Practice* amplifies the behaviour and standards of best practice to guide improvements in performance in the Australian uranium industry.

The Code covers:

1. Continuous improvement to best practice in management
2. Safely manage, contain and transport all hazardous material, tailings and other wastes
3. Provide adequately for mine closure and rehabilitation
4. Continuous improvement in best practice in radiation control
5. Regulatory obligations
6. Provide information about uranium and its properties to stakeholders

The Association has also adopted the *High Level framework for Engagement with Indigenous Communities* endorsed by the Australian Government’s Uranium Industry Framework Implementation Group.
2. BEST PRACTICE GUIDELINES FOR URANIUM EXPLORATION

2.1 Preamble

These best practice guidelines for uranium exploration describe in detail how to put Principles and the Code into practice. The relationship between these various documents is shown in the diagram below.

The specific Uranium Stewardship Principle that relates to this uranium exploration guideline is:

- Continual improvement of our quality, health, safety, security and environmental performance to minimise the impacts of our activities on people and the environment.
The specific parts of the *Code of Practice* that relate to this guideline are:

- Safely manage, contain and transport all hazardous material, tailings and other wastes
- Continuous improvement in best practice in radiation control

These guidelines focus on operations at exploration sites. It is important to recognise that to secure access to an exploration site, stakeholder communications almost always will be a pre-requisite, particularly with the owner of any property on which an exploration site is to be located and, in relation to Aboriginal Heritage and Native Title, any Aboriginal persons or communities claiming an interest in land on which exploration is to occur.

### 2.2 Checklist

There is a number of examples of best practice guidelines for exploration that, in a generic sense, AUA members can review and incorporate into their exploration management plans (see Reference list 3.1).

The specific uranium stewardship aspects that relate to uranium exploration concern the management of radiation and the provision of radiation protection of people and the environment.

Prior to commencing exploration for uranium, a Company should prepare a “*Radiation Management Plan*” for the protection of people and the environment.

The checklist for such a *Radiation Management Plan* should include:

- Regulation
- Risk assessment
- Exploration activities
- Radioactive sources
- Transport
- Sample Storage
- Disposal
- Incident Response Plan
- Appointment of Radiation Safety Officer
- Training
- Measure, review, improve
- Stakeholder consultation
2.3 Regulation

This means documenting and understanding the applicable regulation relating to uranium exploration.

Currently, mining of uranium is permitted only in Western Australia, South Australia and the Northern Territory.

New South Wales and Victoria both have legislation prohibiting uranium exploration and mining. Queensland has policies that prohibit uranium mining, though not exploration.

The relevant legislation and regulations include, but are not necessarily limited to:

2.3.1 Commonwealth Legislation

Section 36 of the *Atomic Energy Act 1953* requires that a person who has discovered a prescribed substance (which is defined to include uranium), “that occurs or occur at any place in Australia shall report that discovery by notice in writing to the Minister within one month after the date of the making of the discovery”.

Regulation 46 of the *Australian Radiation Protection and Nuclear Safety Regulations 1989* is a licence condition that applies to every source and facility licence issued by the Chief Executive Officer of the Australian Radiation Protection and Nuclear Safety Authority (ARPANSA).

Applying to Commonwealth land, it requires the licence holder to take all reasonably practicable steps to prevent an accident involving controlled materials, controlled apparatus or controlled facilities. If an accident happens, the licence holder must take all reasonably practicable steps to control the accident and to minimise the consequences, including injury to any person and impact on the environment. The licence holder must tell the CEO of ARPANSA about the accident within 24 hours and provide a written report about the accident within 14 days.

2.3.2 Northern Territory Legislation

The principle legislation for mining in the NT is the *Mining Management Act 2008*

Health and Safety on mine sites in the NT is regulated by NT WorkSafe under the *Workplace Health and Safety Act 2007*
Radiation safety and personal exposure not related to uranium mining is regulated by the *Radiation (Safety Control) Act 1999*.

Depending on the level of radioactivity, the transport and/or storage of any radioactive material off site may require a licence under the *Radioactive Ores and Concentrates (Packaging and Transport) Act (NT)*.

### 2.3.3 South Australia Legislation

The principal relevant legislation relating to radiation is the *Radiation Protection and Control Act 1982*. The Mining Act 1971 regulates exploration.

### 2.3.4 Queensland Legislation

The relevant legislation is the *Mining and Quarrying Safety and Health Regulation 2001*. Division 2 of the Regulation relates to managing risk from exposure to particular hazards. Additional relevant legislation is the *Radiation Safety Act 1999*.

### 2.3.5 Western Australia


### 2.4 Risk assessment

A radiological assessment of the minerals being explored at the site will be a primary indicator of whether radiation is a hazard which needs to be managed at the site. A risk assessment should be conducted at the initial stage of the project and assessed on all risks (activities, exposures, health, safety, environment) to determine radiation hazards.

Exploration crews searching for uranium can receive radiation exposures from uranium and its associated radioactive decay products in the drill core and cuttings as well as other sources.

Additional exposure could be received from radioactive sources used in down-hole well logging or surface instrumentation (see section 2.6 Radioactive sources).
The risk assessment should identify all the tasks (see section 2.5) that will be undertaken during exploration and at each step an assessment made of the likely potential that the activity will have to cause harm to people and the environment as a result of exposure to or release of uranium ore. A qualitative assessment of the potential for harm will lead to identification of management systems (e.g. the guidelines included in this document) to minimise that harm, an assessment of the effectiveness of the systems and, finally, an assessment of the residual risk.

The basic risk principle is to achieve risk levels ‘as low as reasonably achievable, social and economic factors being taken into account’ – commonly referred to as ALARA.

Quantitative risk assessments should also be considered and there are various models freely available; for example, http://www.epa.gov/rpdweb00/assessment/software.html


### 2.5 Exploration activities (See Reference 3.2)

Thorium-232 and uranium-238 are the `parents' of a series of radioactive elements called `daughters' which emit alpha (α), beta (β), and gamma (γ) radiation.

The activity concentration of 1 Becquerel (Bq)/g is currently the internationally-accepted level for defining the scope of regulation for naturally occurring materials containing uranium and thorium.

For example, if 0.008%, or 80ppm, of uranium ore has an activity concentration of 1 Bq/g then this will be the trigger to conduct further assessment. Where 0.025 % or 250ppm thorium has an activity concentration of 1 Bq/g this will also require further assessment.
At activity concentrations less than 1 Bq/g, these minerals would be considered not to be radioactive for purpose of regulation, under the National Directory for Radiation Protection. At higher activity concentrations, the site should be assessed case by case. The activities may also be determined as being inherently safe, e.g. if the source of the radionuclides are insoluble or immobile.

Based on results from above, the operating company should assess the risk by monitoring. Where it is likely that the potential dose may exceed the dose limit for members of the general public, a comprehensive risk assessment should be carried out by the operating company utilizing an appropriate monitoring program and controls implemented according to the level of risk.

Table 1: Radiation limits and dose rates to reach each limit working 2000 hours per year.

<table>
<thead>
<tr>
<th></th>
<th>Member of General Public</th>
<th>Designated employee</th>
</tr>
</thead>
<tbody>
<tr>
<td>Radiation dose limit</td>
<td>1 mSv per year above background</td>
<td>20 mSv per year above background³</td>
</tr>
<tr>
<td>Dose Rate to reach limit</td>
<td>0.11 μSv/hr above background</td>
<td>10 μSv/hr</td>
</tr>
<tr>
<td>DAC for uranium ore⁴,⁵</td>
<td>N/A</td>
<td>2.4 αdps/m³</td>
</tr>
<tr>
<td>DAC for thorium ore⁴</td>
<td>N/A</td>
<td>1.0 αdps/m³</td>
</tr>
</tbody>
</table>

Notes

1. Radiation dose limits for Member of the General Public and Designated Worker adopted from Australian Radiation Protection and Nuclear Safety Agency (ARPANSA), Radiation Protection Series No. 1.
2. “Designated employee” means an employee who works, or may work, under conditions such that the employee’s annual effective dose equivalent might exceed 5 mSv. "Non-designated employee" means an employee who is not a designated employee.

3. 50 mSv in any one year and 100 mSv summed over 5-years.

4. DAC – Derived air concentration for 5 and 20 mSv over 2000 hrs of exposure. Workers are typically exposed to both external gamma radiation and dust from the ore.

5. DAC for uranium ore calculated from Table 1 in ARPANSA Radiation Protection Series No. 9.

Exploration crews working with uranium may receive radiation exposures from:

- Gamma radiation emitted from the uranium mineralisation (e.g. outcropping ore, large masses of core trays or bagged chip samples)
- Inhaling radon (and the resulting radon progeny decay products) emanating from the core rods and drill cuttings
- Inhaling radioactive dust
- Ingesting radioactive dust

The primary source of worker radiation exposure will be from external gamma radiation and from inhalation of long life alpha emitters in ore dust. The radiation dose received by exploration crews will depend on:

- the grade of the mineralization
- the amount of time spent by workers close to mineralized drill core and cuttings
- the amount of mineralized drill core and cuttings in the vicinity
- the distance between workers and the drill core and cuttings
- the extent of personal exposure to airborne dust (especially important in RC drilling)
2.6 Radioactive sources

The use of radioactive sources in borehole logging is governed by regulations under the appropriate radiation control legislation in all States and the Territories. The appropriate statutory authorities responsible for administering this legislation are listed in Annexe I of the *Code of practice for the safe use of sealed radioactive sources in borehole logging (1989)* – see references 3.5.

The radioactive sources used in borehole logging are generally of sufficient activity to require adequate shielding and handling with proper care. Untrained or inappropriately qualified personnel or unauthorised persons should not attempt to use, repair or adjust these radioactive sources. A radiation licence is required for this work.

The **Radiation Management Plan** should include the following:

- name and contact details of all Radiation Safety Officers
- register of all radioactive sources (down-hole, surface and handheld) on site\(^1\)
- registration details of the source
- identity of licensed operators and licence details
- storage and transport procedures
- on-site testing procedures
- emergency response plan for loss/damage of source
- regular review and reporting

2.7 Transport

The transport of all radioactive materials to and from site, including radioactive mineral samples, must conform to the *Code of Practice for Safe Transport of Radioactive Material 2008*.

Sample material may be transported to laboratories or to permanent storage via road. Transport of these materials should comply with the *Code of Practice for Safe Transport of Radioactive Material 2008*.

\(^1\) Prior to the commencement of a drill program, any old drill holes should be reviewed. This would include any old assay information and scintillometer readings.
Transport of Radioactive Materials 2001, (referenced in the Australian Dangerous Goods Transport Code) and any relevant specific State legislation (see reference list).

The Code sets out rules for (i) labelling of packages containing radioactive materials; (ii) placarding of vehicles which transport them, and (iii) issue to driver of Consignor’s Certificate describing the material being transported.

For an excepted package, the radiation level at any point on the external surface of an excepted package shall not exceed 5μSv/h.

The measurement should be taken on the surface of the package.

Excepted packages must bear the marking “RADIOACTIVE” on an internal surface in such a manner that a warning of the presence of radioactive material is visible on opening the package. In addition, they must be labelled on the outside of the package with ‘UN 2910’ and the same notation must be on the consignment note.

The “RADIOACTIVE” sign however, is required to be visible when, for example, the covering is taken from the top of the truck or when a container is opened. The word RADIOACTIVE must be visible upon opening the package.

2.8 Sample Storage (See Reference 3.6)

It is a good practice to maximize the distance of workers from mineralized core and to limit the amount of time that workers spend near mineralized drill core. This implies limiting the amount of mineralized core stored in drill and core shacks where possible.

In order to minimise personnel exposure to radiation, the use of mineralized core boxes as seats or benches is not recommended.

On-site, radioactive samples should be stored away from normally occupied areas, and well ventilated if held in an enclosed space. Strict hygiene protocols must be enforced (i.e. no smoking, eating or drinking). Particularly active samples should be placed in a sign-posted designated area. All radioactive samples must be clearly labelled as such and radioactive sample bags should be sealed and in good condition to prevent release of radioactive dust.
Off-site storage facilities for radioactive samples may require licensing or registration under State radiation protection regulations. The regulatory conditions may include signage, working rules, monitoring, waste management and structural issues.

In order to provide practical advice on the gamma dose rates to be expected from a box of mineralized drill core, the gamma dose rates should be measured for single core boxes filled with various grades of uranium mineralization (about 25 kg). A summary of the results is shown in the following table:

**Table 2: Gamma Dose Rates at specified distance from a Single Core Box**

<table>
<thead>
<tr>
<th>Grade Uranium</th>
<th>@0.5 m</th>
<th>@1 m</th>
<th>@1.5 m</th>
<th>@2 m</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1%</td>
<td>0.2</td>
<td>0.1</td>
<td>0.03</td>
<td>0.02</td>
</tr>
<tr>
<td>0.2%</td>
<td>0.4</td>
<td>0.1</td>
<td>0.06</td>
<td>0.03</td>
</tr>
<tr>
<td>1%</td>
<td>1.8</td>
<td>0.6</td>
<td>0.3</td>
<td>0.2</td>
</tr>
<tr>
<td>5%</td>
<td>9</td>
<td>3</td>
<td>1</td>
<td>0.8</td>
</tr>
<tr>
<td>10%</td>
<td>17</td>
<td>6</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>20%</td>
<td>35</td>
<td>12</td>
<td>6</td>
<td>3</td>
</tr>
</tbody>
</table>

This information can be summarized in a simple formula for the gamma dose rate (GDR) from a single core box at a distance of 1 m from the midpoint of the box:

- \( \text{GDR (μSv/h)} = 0.61 \times (\% \text{ Uranium Grade}) \)

The Appendix illustrates examples of the use of Gamma Dose Rate to determine radiation protection requirements.
2.9 Sample containment and disposal

Percussion drill hole programs should be conducted in such a way to minimise the generation and release of drill dust. Good practice is to deploy dust containment systems (e.g., reverse circulation, use of closed cyclones, wet drilling).

Core drill sumps should be lined and all drilling fluids contained to prevent radiological contamination of surface soils. Mud pits at drill hole locations should be allowed to dry and then be covered by one metre of compacted soil.

Any groundwater, drilling or cutting fluids, core cutting slurry, etc. should be contained where there is potential for adverse effects from the water to persons or the environment both within and outside the mining lease. The contaminated water should be directed to a mud pit or similar, allowed to dry, and be covered by a minimum of 1.0 m of compacted clean soil.

Solid cuttings should be returned to the drill hole. Where this is not possible, individual drill hole solid cuttings and samples should be removed from their sample bags and buried in adjacent mud pits, if available, with at least one metre of compacted soil cover.

**Bulk Samples**

Bulk cuttings or samples (i.e., from multiple drill holes) and returned analytical samples should be removed from their sample bags and mixed with soil to reduce any artificial concentration of the material and buried in a mud pit (or similar) with two metres of compacted soil cover.

**Disposal Pit**

The disposal pit for bulk samples should:

- only hold samples removed from their sample bags and containers, and should not be used to dispose of other wastes generated on site
- be located in a stable area that does not compromise its future use, and on ground not subject to flooding or erosion which may re-expose the material

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2 100% cotton or biodegradable plastic bags are best practice. This avoids the need to debag any sample.
• be constructed so as to ensure the material has at least 2 metres of clean and compacted soil cover
• be located within exploration leases associated with the authorised exploration program

Where companies require a bulk disposal pit, the location, dimensions and construction requirements must be included with the information submitted to the regulatory authority for approval. If a bulk sample pit has not been included within the approved exploration plan, the company is usually required to supply an addendum to the authorised program for approval. The application must also clearly demonstrate why a specific location has been proposed, taking into account all potential stakeholder and environmental issues including topography, social, biological and radiological aspects.

For rehabilitation purposes, the area of the drillhole, mud pit and bulk disposal pit should be surveyed to determine background gamma dose rates (or scintillometer count rate) before drilling commencement and after site rehabilitation. Before leaving the site background gamma dose rates should be similar to initial background levels. The method should be defined in the UMP and records kept of the results.

**Disposal Pit Closure Report**

A ‘closure report’ should be completed for each pit providing:

• the location (GPS coordinates) and dimensions of the pit
• a list of contents
• photographic confirmation of the construction of the pit
• photographic confirmation of the pre-closure waste location within the pit indicating depth
• measured gamma dose rates (or scintillometer rates) before construction and after closure.

The pit closure report is usually required to be forwarded to the regulatory authority within a specified period, for example, one month, of pit closure.
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Analytical Sample Returns

It is common practice for off-site analytical laboratories to return samples to the owner once analysis is completed. The analytical laboratory may also send other materials from the analytical process to the owner for disposal. Any radioactive sample returns should be disposed of in the same manner as surplus samples (see above).

Other wastes (empty bags, PPE, etc), should be drummed and go to a licensed landfill as un-contaminated waste (in respect to radioactivity) provided they are not radioactively contaminated. Radioactive waste may not be permitted for disposal to general landfill.

Sample returns from barren intervals (i.e. not radioactive samples) can also be disposed of in a licensed landfill.

A more conservative practice would be to treat sample bags and PPE as contaminated.

Potentially Contaminated Waste Materials

Where items are suspected of being contaminated to the extent they are considered ‘radioactive waste’, the waste items should be drummed and stored on site for further assessment. The regulatory authority should be contacted for advice on the assessment required.

Any groundwater, drilling or cutting fluids, core cutting slurry, etc shall be contained where there is potential for adverse effects from the water to persons or the environment both within and outside the mining lease. The contaminated water should be directed to a mud pit or similar and be covered by a minimum of one metre of compacted clean soil.

2.10 Incident Response Plan

A Radiation Management Plan needs to include the development of an incident response plan. The key components of the Incident response plan should take into account:

- what can happen – a development of scenarios that may need to be managed (eg borehole logging equipment goes missing)
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- who is available to assist – identify personnel, both internal and external that may assist with recovering from the incident; ensure the names and contact details of on-site Radiation Safety Officers and relevant government regulatory officials are available
- communication plan – who says what to whom, to ensure that the appropriate stakeholders are advised of the incident in a timely fashion
- who does what when – identify specific roles to manage the incident, identify appropriately trained personnel to fill those roles, identify chain of response to specific incidents/scenarios
- location of plan – ensure that the incident response plan is well understood, is readily accessible, that role players are contactable and that simulated exercises are conducted. Consider including emergency services and/or regulators in such simulations

The development of plans along these lines is critical to the successful management of exploration activity and needs meticulous supervision.

2.11 Training (See Reference 3.3)

A fundamental component of a successful Radiation Management Plan is the consideration of appropriate training commensurate to the risk assessment.

Based on the level of risk, determined in Section 2.4, including the degree of radioactive mineralisation, consideration should be given to assigning a site radiation safety officer.

A radiological assessment of the minerals being explored at the site will be a primary indicator of whether radiation is a hazard which needs to be managed at the site. A risk assessment should be conducted at the initial stage of the project and assessed on all risks (activities, exposures, health, safety, environment) to determine radiation hazards.

The Radiation Safety Officer (RSO) should be qualified in accordance with the statutory requirements to perform dose estimation, provide technical advice regarding radiation exposure, and control the exposure. The RSO shall also ensure that the radiation plan is fully implemented and also be responsible for reviewing the plan.

Employees and contractors should receive general training in radiation safety, be aware of the risks of working with minerals containing elevated levels of radioactivity and the necessary steps to minimise their exposure.
If laboratory testing demonstrates that minerals have elevated levels of radioactivity, a portable radiation monitoring device should be available on site at all times to monitor radiation levels, including gamma and alpha activity, in drill core and dust. It is important that the equipment be properly maintained, calibrated, handled carefully to avoid contamination and only used by trained personnel. Poorly used or understood equipment can provide a false sense of security. If the equipment is not working properly it may indicate that no radioactivity is present when there might be.

Regular monitoring should be conducted and data recorded in a log.

Appropriate dust controls, including dust suppression and localised exhaust ventilation, will reduce the potential of inhaling dust. Where there is potential for exposure to inhalable dust (ie. during core cutting, intersecting ore), respiratory protective equipment (dust masks) should be used. Dust masks are not required for wet mud drilling. Gloves and appropriate work clothing should be worn when using drilling equipment and handling ore samples to minimise any skin contamination.

Core sheds must be organised to limit the amount of mineralized core stored, and the use of mineralized core boxes as seats or benches is not recommended. Core sheds should be well ventilated.

Good hygiene practices are necessary, including hand and face washing prior to eating and smoking. The measures put in place shall be commensurate with the hazards on site determined in section 2.4. Where the hazards are present, consideration shall be made to making the site “clean in” “clean out”, with laundering and shower facilities being provided on site.

Worker exposure can be minimised by locating cores away from occupied areas and drillers assistants not carrying bags of sample close to their bodies.

Where employees are potentially exposed to radiation above 1mSv per annum, then personal exposure monitoring shall be considered. The type of monitoring will be commensurate with the risk assessment determination in 2.4. Where radiation monitoring is required, the site shall ensure that resources are available to store dose records and reports for the appropriate period of time.

Records of monitoring results, dose assessments including calculation methods and related information, should be retained in a form that will allow them to be retrieved.
2.12 Measure, Review, Improve

A Radiation Management Plan should be a living document. Various parameters should be identified for measuring – key performance indicators. Performance against indicators should be reviewed at least on an annual basis or at other appropriate intervals (e.g., on completion of a drilling program).

Where performance does not achieve the targeted level of performance, review reasons for the shortfall and consider improving the system in order to improve performance.

Share best practices and performances with others in the uranium exploration industry.
APPENDIX

Use of Gamma Dose Rate to Determine Radiation Protection Requirements

Example 1

Consider a drill shack with a core box filled with 1% uranium mineralization at a distance of 1.5 m from the drill crew. From Table 2 we find the GDR to be 0.3 μSv/h.

If we assume a worker spends 500 hours per year working next to this core box, his annual radiation exposure will be:

Annual Dose = 0.3 μSv/h x 500 h = 150 μSv/y or 0.15 mSv/y.

According to the NORM Guidelines there are no requirements for radiation protection from this gamma radiation.

Example 2

The gamma dose rates in a workplace will depend on the amount of mineralized core near the workers. If three boxes of 1.0 % drill core are placed one on top of the other, the GDR can be expected to triple.

A worker spending 500 hours per year in this workplace would now receive 0.45 mSv/y. This annual radiation dose would place the worker into the second category of the NORM Guidelines (NORM Management). At this point the company would be required to provide workers with a calibrated dose rate meter to more accurately ascertain the GDR levels and minimize worker exposures. It should also be used to ensure that no workers are receiving more that 1 mSv/y (Dose Management category).

Example 3

Consider a geologist in a core shack who spends 500 hours examining and logging 1% uranium core. The worker’s average distance from the core box is likely to be about 0.5 m from the box. According to Table 2 the GDR at this position will be 1.8 μSv/h. Hence this worker can expect to receive an annual radiation dose of:

Annual Dose = 1.8 μSv/h x 500 h = 900 μSv/y or 0.9 mSv/y
According to Table 1, an annual radiation dose of 0.9 mSv places this worker in the NORM Management category. Once again the employer will be required to provide a calibrated gamma dose rate meter to more accurately assess and minimize worker radiation exposures.
REFERENCES

3.1. Generic Exploration

http://www.goodpracticemining.org/
http://www.icmm.com/
http://private.e3mining.com/index.cfm
http://www.mining.ca/www/Towards_Sustaining_Mining/index.php
http://www.bullion.org.za/

The Australian Uranium Association and the Federal Department of Energy, Resources and Tourism have published a guide to radiation safety:


The Australian Government, in association with the Minerals Council of Australia, has produced a number Leading Practice Sustainable Development Programme for the Mining Industry (Australia):

http://www.ret.gov.au/resources/mining/leading_practice_sustainable_development_program_for_the_mining_industry/Pages/LeadingPracticeSustainableDevelopmentProgramfortheMiningIndustry.aspx


Handbooks
There are 14 titles in the series. Currently, 12 of these handbooks have been produced:

- **Overview Handbook** - provides a summary of the Leading Practice Sustainable Development Program.
- **Stewardship Handbook** - outlines the main principles of stewardship. Stewardship involves the care and management of a commodity through its life cycle partnerships. The handbook discusses materials stewardship, resources stewardship, process stewardship and product stewardship.
- **Mine Rehabilitation Handbook** - outlines the principles and practices of mine rehabilitation. Rehabilitation is the process used to repair the impacts of mining on the environment.
- **Mine Closure and Completion Handbook** - examines planning for mine closure and completion after a mine has reached the end of its life. It describes the business case for planned, structured and systematic mine closure and completion of mines in the context of sustainable development.
- **Community Engagement and Development Handbook** - addresses some of the key issues surrounding community engagement and development and offers insights, approached and practical discussion about the challenges that companies may encounter as they engage with local communities and seek to contribute to their long term development.
- **Working With Indigenous Communities Handbook** - addresses issues relating to working with indigenous communities, including issues such as cultural heritage and land rights.
- **Biodiversity Management Handbook** - addresses the broad issue of biodiversity management for mining operations, including environment protection and conservation legislation, flora and fauna management, landscape level planning and environmental offsets.
- **Managing Acid and Metalliferous Drainage Handbook** - addresses issues related to the social and environmental impacts and remediation of acid and metalliferous drainage in the mining industry.
- **Tailings Management Handbook** - addresses tailings management through the life of the project (including planning, design, operation and closure of tailings storage facilities).
- **Water Management Handbook** - addresses issues relating to water management within the mining industry.
- **Cyanide Management Handbook** - addresses the principle and procedures for effective and safe cyanide management.
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- Risk Assessment and Management Handbook - addresses issues relating to identifying, assessing and managing risk in the mining industry.

Translations
Many of the handbooks are available in different languages including Chinese, Korean, Bahasa Indonesian, Spanish, Vietnamese and Japanese. The Leading Practice Sustainable Development Program for the Mining Industry Translations webpage has links to translated versions of the handbooks.

3.2. Uranium Specific Guidelines

3.2.4 http://www.aurora-energy.ca/?p=environment&s=Radiation+Protection

3.3. Commonwealth legislation


3.4. State and Territory Legislation
3.5. Borehole logging