NORM in Western Australia – plenty of mineral but not enough human resources

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Western Australia

Area: 2,529,875 km², Capital – Perth

Population ~2,600,000, 92% in Perth and the South-West;

Average population density in the State ~ 1 person / km²

The rest of the State uses different measure: km²/person

Typically around 7-9 km²/person, up to 30-40 km²/person

Western Australian mining industry

- Direct employment: 113,000 people (9% of total WA workforce).
- 85% of the State's and 41% of Australia's income from exports.
- 130 large mining projects, hundreds of smaller quarries and mines, travel from Perth to many remote sites 6-8 hours one way.
- Minerals mined and processed: iron, oil, gas, gold, aluminium, nickel, cobalt, copper, lead, zinc, titanium, zirconium, lithium, tantalum, coal, salt, diamonds, manganese, vanadium, rare earths, palladium, platinum, silver, tin, talc, gypsum, phosphate, uranium (in the future).
- Three State Government departments, different regulations: Department of Mines, Industry Regulation and Safety (DMIRS), Department of Health (DoH), Department of Water and Environmental Regulation (DWER).
- Memorandum of Understanding (MoU) exists between DMIRS and DoH to minimise potential overlap or duplication of regulatory responsibilities in relation to radiation safety for mining operations.

Requirements for the Radiation Safety Officer

- **Education**: minimum of a Bachelor degree in a technical discipline (preferably in physics, chemistry or engineering).
- **Training**: ventilation officer course, static radiation gauges RSO course, and an "appropriate advanced course in radiation protection in mining and mineral processing".
- **Knowledge**: employment history in mining and/or processing industry, practical experience in radiation safety in mining for a minimum of 12 months.

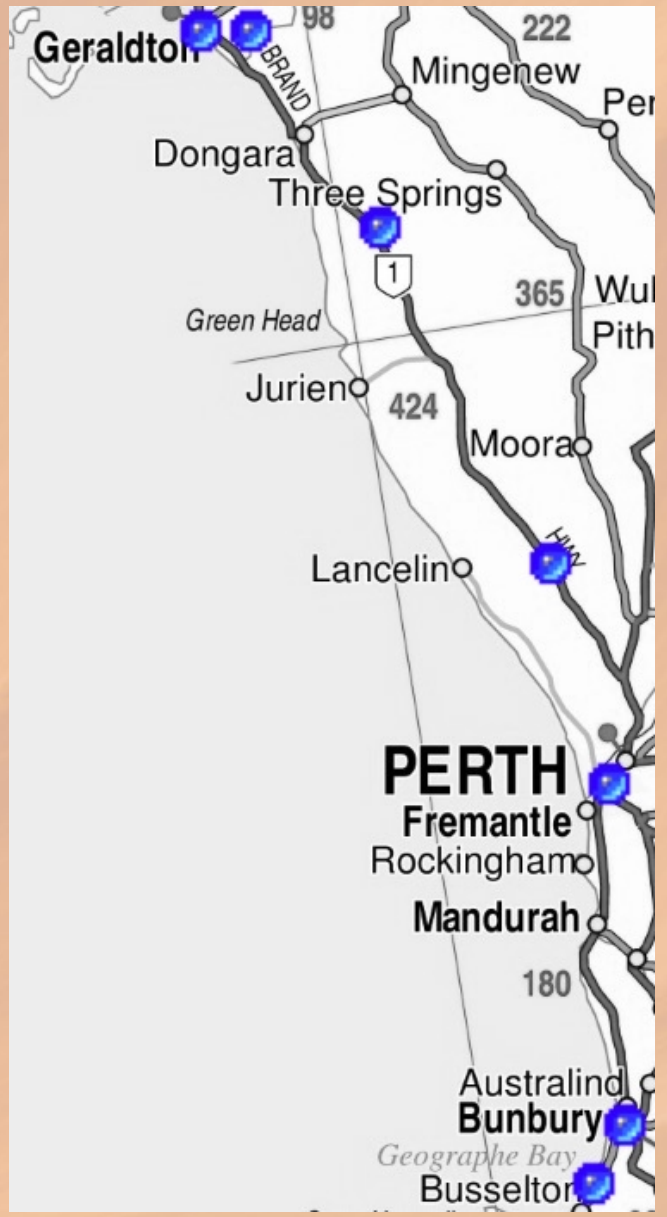
No full time Radiation Safety Officers exist

- Radiation safety: *minor* part of the *primary* job of the statutory radiation safety officer (laboratory supervisor, safety adviser, environmental specialist, metallurgist, etc.)
- Significant decrease in knowledge and experience in the industry. Some RSO's lack an understanding of basic radiation protection principles.
- Most RSO's are not aware of the statutory character of the position and their personal legal liability.
- Some consultants come from the university, laboratory or government background and have only a theoretical knowledge of the industry.
- A shortage of appropriately educated and experienced personnel in WA Government Departments.

The Radiation Safety Officer work – a personal example

Primary site: Safety Officer (inspections and inductions of new workers), Ventilation and Noise Officer (dust and noise monitoring), Occupational Hygienist (heat stress, chemicals, biological hazards, ergonomics, etc. etc.). Radiation Safety Officer (fixed gauges and mining / mineral processing).
Also participation in numerous other activities and training on and off-site.

Six more sites (mines, processing plants, ports, mineral storage) – Radiation Safety Officer. Driving between all sites: ~3,000 kilometres per month.



The role of the consultant

A private company and a government department often need to use an external expertise in radiation safety.

WA DMIRS always requires information on how much time a person is going to spend working for a specific company:

- To ensure that sufficient resources are allocated for radiation protection for the particular site, and
- To confirm that no consultant is proposing to work for different companies for more time that is physically possible.

Advanced training courses: past

Late 1980's: Developed by the Australian Radiation Laboratory in Melbourne (now part of ARPANSA), was available until mid-1990's.

Early 1990's: Developed by the Australian Nuclear Science and Technology Organisation (ANSTO) in Sydney.
Mid-1990's: duration halved and only 4 hours were dedicated to mining, until early 2000's.
Still available, but mining appears to be a very small part of the course.

Late 1990's: Developed by a consultancy Radiation Advice and Solutions.
Available in infrequent intervals and remains the only advanced training course available to the industry at the current time.

Government Skills Australia units

2008-2010, Federal Government: development of competency standards for radiation protection. Outcome: ten training "units" that each registered training organisation needs to comply with in order for the training course to be recognised Australia-wide.

Consultations with the industry and the relevant Government departments in WA: numerous comments provided but none taken into account. Result: most units remain mainly generic, without the necessary specifics of the mining and mineral processing industry; therefore, they are of no practical use.

It is appears impossible to determine who (if anyone) may be available to amend those units as required.

Government Skills Australia units

The bureaucratic burden is enormous, as the development of the induction level course several years ago has clearly demonstrated.

Approximately 90% of the time was spent on accreditation:

- 'Mapping' of the course: linking the contents with each and every line listed in the relevant unit on official forms, and
- Completing numerous and voluminous submissions to different government departments that deal with training in general (and, thus, have no understanding of industry specifics).

The work on presentations and hand-out materials took about 10% of the total time spent on the course development.

Only a "registered training organisation" is allowed to do this training – a very high cost of registration and regular audits.

Recent developments

2012: ANSTO commenced the development of a 'mining' radiation safety course. What work has been incorporated into the current course and experience of presenters in mining are not known.

2014 and 2018: Two universities (one in South Australia and one in Western Australia) proposed to develop post-graduate courses in radiation protection:

- An attendance of 12-15 persons is required for such course to make any economic sense, but not more than 2-3 would be available at any given time. It is extremely unlikely that any mining professional will have the required time off-work to attend this training.
- The relevance of these courses to the mining and mineral processing is unknown. It is currently impossible to ascertain what, if any, experience in mining in mineral processing the developers and the presenters of this course would have.

Recent developments

Several other training courses were developed. However, most of those were prepared by people with no work history in mining and mineral processing industry.

In the mining industry one cannot become a haul truck driver or an excavator operator without actually getting training in operating that specific mining equipment and being supervised and guided by an experienced personnel before receiving an accreditation "ticket".

The theoretical knowledge is mostly useless without the knowledge of its application in a real mining and/or processing environment.

Current situation

No legal requirement for a presenter of a training course for the mining industry to have any work history or actual experience in mining.

The only paramount requirement: “Certificate IV in Training and Assessment” that can be obtained in two weeks. This fact led to many embarrassing situations where presenters reading from the prepared slides were unable to answer very simple questions.

Currently anyone can obtain this Certificate IV and thus be qualified to present courses on almost any subject.

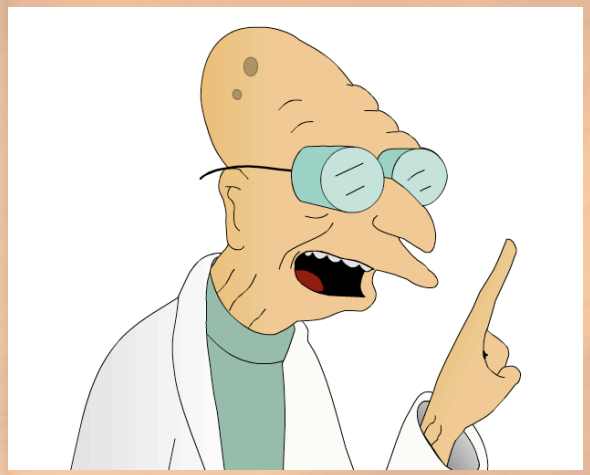
Current situation

The mining and mineral processing in Western Australia: the only branch of radiation protection where the requirements for the radiation safety personnel qualifications and employment history are not legally formalised (only a guideline exists).

No one without relevant qualifications and experience can develop and run a training course on radiation protection in areas such as industrial radiography or fluoroscopy.

But there are no barriers for a dentist or a university tutor to open a company with the name associated with mining and subsequently offer 'radiation protection in mining' advice and training courses.

Process and results of some radiation safety training



Current situation

Possibility of future class actions and claims for compensation for diseases allegedly caused by radiation, as well as for the radiological contamination of land and water.

The possible involvement of both the Government and present statutory RSO's in these litigations is likely.

Currently available and proposed courses under development may not be suitable for the needs of Western Australia.

Radiation protection training for RSO in the future

The advanced radiation protection course for the mining and mineral processing industry is currently being developed.

Proposed duration: one week.

Proposed contents:

- 32 lectures,
- 6 practical tutorials (on the use of different equipment),
- 6 exercises (mostly calculations), and
- An exam (competency assessment).

All relevant Australian and International regulations, codes and guidelines will also be provided.

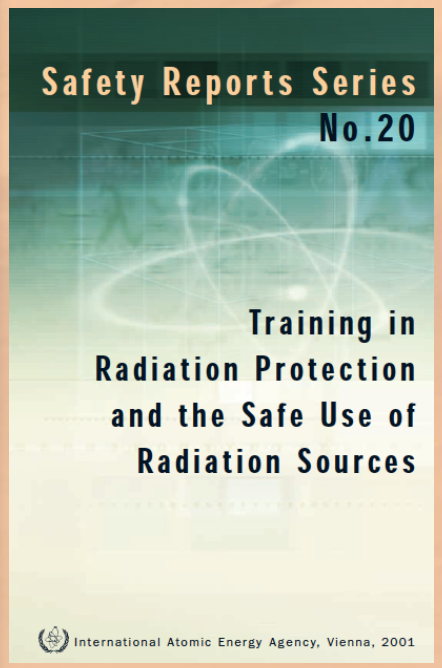
Radiation protection training in the future

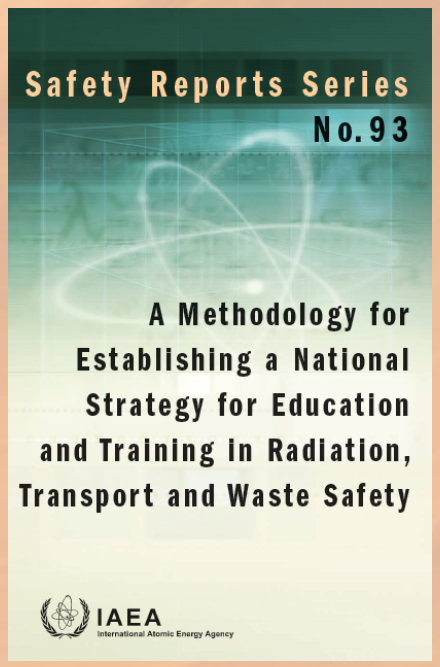
All developed materials are to be based on:

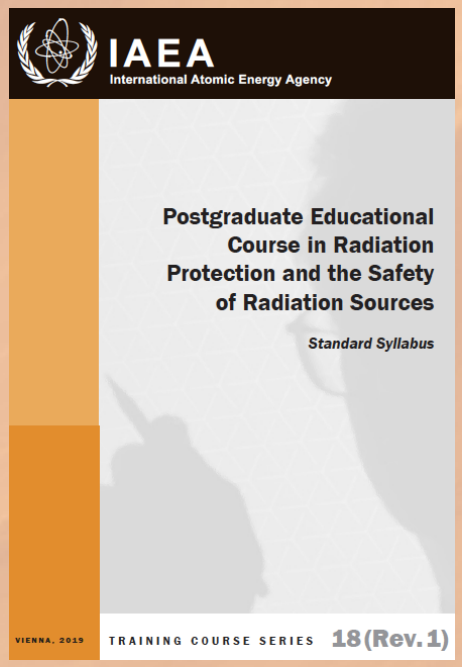
- Industry experience in mining and processing of NORM worldwide,
- Western Australian legislation and Australian Standards,
- Relevant IAEA Safety and Technical documents,
- National guidelines and technical documents where the information is not available in Australia: from the USA, Canada, European Union, South Africa, Brazil, Kazakhstan and Malaysia.

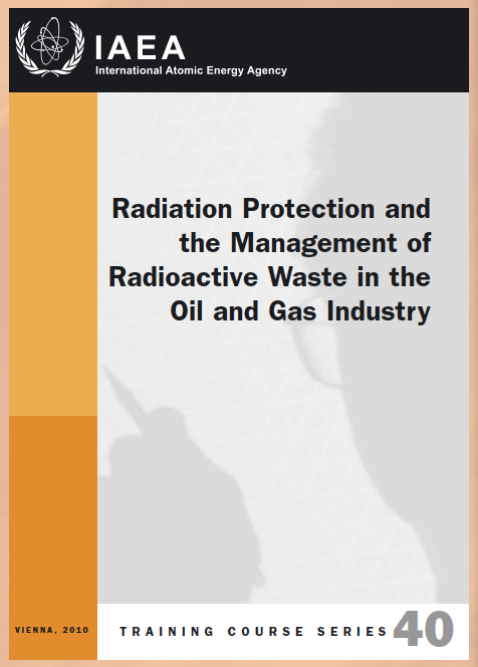
Radiation protection training in the future

The guidance from many relevant IAEA documents is also used in the development of the training course, with specific attention being paid to these four publications:









Radiation protection training in the future

The most important consideration:

- It should not be expected that the RSO at a mining/ processing site will remember the values for the dose conversion factors for the inhalation of 5 µm size dust containing ^{232}Th, or for the ingestion of water containing ^{226}Ra, or typical ^{220}Rn equilibrium factors. Neither there is a need to remember which are the necessary parts of a document such as an Environmental and/or Radiological Impact Assessment.
- It is deemed more important to ensure that the RSO:
  - Will know where to find the necessary information, and then
  - Will know how to put the information to good and proper use at his/her site.


Thank you for your attention!