

# International Symposium on Uranium Raw Material for the Nuclear Fuel Cycle: Exploration, Mining, Production, Supply and Demand, Economics and Environmental Issues (URAM-2018)



Contribution ID: 172

Type: ORAL

## “It’s Not All About the Radiation!” - Practical Radiation Management

*Wednesday, 27 June 2018 14:20 (20 minutes)*

### INTRODUCTION

For uranium miners and producers, the control of environmental, worker and public exposure to radiation is a critical management objective. Corporate obligations, statutory requirements and public expectations generally manifest as radiation management plans (RMPs).

It is important for worker, public and regulator confidence that the RMP is practical and competent. From an operational perspective, it is also important that the RMP is an integral part of the broader health, safety and environmental management plans. This is because, in practice, the radiation risk is generally low in most uranium mining and processing operations and it is important to ensure that the radiation risks remain in perspective with other environmental and safety risks.

This paper explores experiences from case studies at mining and processing facilities to identify practical tools for effective development and implementation of appropriate and quality RMPs and for ensuring that radiation risks remain in perspective.

The authors experiences are from a range of operating facilities that have had to deal with the presence of naturally occurring radioactive materials. This includes uranium mines and processing facilities, through to rare earth producers, whose main exposures come from the Th232 decay chain, through to other mining operations where NORM is present. Experiences are generally common across the sectors, although, the expertise and competencies in the uranium sector greatly exceeds that in other sectors.

### BACKGROUND

The radiation exposure to workers in the modern uranium mining and processing industry have been demonstrated to be low and well controlled [1]. Extensive efforts in the early decades of the life of the industry acted to identify and quantify the risks and establish standards that greatly improved conditions. This resulted in the current high standards of radiation protection that exist in the industry today. Such controls included minimising exposures to radon decay products in uranium mines with effective ventilation, through to ensuring that final product dusts are eliminated or contained.

Legacy sites continue to be problematic but provide a constant reminder of the costs and risks of not providing adequate levels of control for radiation.

### EFFECTIVE RMPS

The RMP is an important document and there are a number of practical factors that can be considered to ensure that it remains relevant and fit for purpose. These factors are based on practical experiences elsewhere.

#### Clarifying the Role of the RMP

In some cases, an RMP is developed to purely comply with regulatory requirements. In these cases, the RMP is seen as a compliance document rather than a practical management plan for radiation at the site or operation. Legislative requirements and guidance documents are useful and should be used as the platform or the framework for the RMP, however, the content and details should be developed and owned by the operator.

Ownership of the RMP and its content is important, because at the end of the day, the operator has primary responsibility for the safety and wellbeing of the workforce under their management and control - not the regulator. The operator is also responsible for protecting the environment and members of the public. Merely complying with regulations does not guarantee an adequate level of protection.

At an operational level, the RMP should be practical and able to be used by management and workers alike. It should provide the necessary tools and justifications for implementing and enforcing controls. It should outline accountabilities and responsibilities and relevant training. It should also cover reporting requirements and incident investigations. Many guides exist on the minimum content for RMPs [2,3].

Sometimes, the RMP is incorrectly seen as being a Radiation Monitoring Plan, with radiation monitoring seen as the means for management. This has two consequences. It can provide a false sense of security because all that gets measured is all that exist in the monitoring plan. Secondly, the desire for investigative monitoring is lost in favour of compliance monitoring.

Pure compliance monitoring can also result in complacency. If, for example, the routine radiation monitoring shows that results are low, no additional work is done and it is assumed that radiation is under control.

#### Non Technical Characteristics of a RMP

Experience shows that RMPs should also have the following characteristics;

- Practical and able to be understood by operations personnel,
- Balanced and consider the actual risks from radiation,
- Appropriately conservative as not to be seen to be dismissive of radiation and able to provide confidence that the radiation levels are controlled,
- It should exist within the broader site health safety and environmental management plans,
- Of sufficient quality to provide confidence and also maintain recognised standards.

It is relevant to note that none of the above characteristics give an indication of what should be in the RMP itself. The characteristics assume the technical component of the RMP and provide the framework for the balance, quality and practicality of the document.

#### Supported by Appropriate Knowledge and Competence

An expected characteristic of uranium explorers, miners and producers is that there will be a high level of competence in radiation protection.

However, what does this mean in practice?

It means having sufficient internal knowledge to make informed decisions and staff who are competent to make the decisions.

To support the RMP and understand the radiological risk, such knowledge that needs to be considered includes;

- Characterisation of the materials being handled, from geological samples through to process materials and wastes –this includes characterising both the radiological and non radiological properties,
- Understanding the natural background levels in the region and its variability in order to provide some perspective to the anticipated potential exposures,
- Understanding the behaviour of radionuclides through the whole process.

Competent staff should be able to;

- Predict and measure the potential radiological impacts to workers, the public and the environment, using recognised international standards,
- Effectively communicate with senior managers through to workers and the public,
- Contribute to the broader discussion on radiation protection, rather than just complying with regulatory requirements,
- Learn,
- Be professional in all matters.

#### Effective Two Way Communications

The most significant portion of radiation management is communication and discussion. It is essential for a number of reasons;

- Being able to identify problems before they arise,
- Providing a non-confrontational means of information sharing,
- Building knowledge.

Communicating the existence and contents of the RMP to management, the wider workforce and to the community is important. It demonstrates the company's commitment to formalising its approach to radiation management. It is equally important to communicate the results and reviews that occur under the RMP.

A practical form of communication involves informal and regular discussions with the workforce, for example at lunch or while on the job. When management or the radiation adviser provides a presence in the workplace, it is easier for the workforce to engage in discussion.

However, radiation and radiation protection is a complex area. In some situations, the radiation staff can be known as “boffins”, and sometimes make communications quite unnecessarily complex and difficult. Radiation does not need to be made any more complex than it already is and enabling workers and the public to ask questions is important. A saying is that “in radiation, there are no dumb questions!” Saying this up front enables people who genuinely have a question feel more at ease asking the question.

A parallel situation occurs with the public in relation to environmental radiation and public dose impacts from the project. The overall intent is to ensure that there is an unconstrained space where questions can be asked and answered properly communicated.

#### Maintaining Perspective

An important part of a RMP is ensuring that it fits within the broader operational health, safety and environmental management plan. Apart from the presence of uranium, the exploration site, the mining operation and the processing facility are just industrial sites with their own particular hazards. Too often, the radiological risks are seen to take priority. Other chronic and acute hazards need to be properly recognised and there must be assurance that resources are properly allocated to controlling the higher risks.

For most operations, the radiological risks are low.

In some cases controls for radiation can act to control other workplace hazards. For example, ventilation acts to control exposures to radon decay products, but also provides protection against the buildup of dusts and gases (and heat for underground mines).

#### CONCLUSION

This paper has aimed to provide some practical considerations for the effective development and implementation of a RMP based on experiences at various mines and processing facilities. The key messages are that RMPs should;

- Be more than a compliance document,
- Be part of a broader health, safety and environmental management system,
- Be supported by internal knowledge and competent staff.

#### REFERNECES

The matters outlined in this paper are from the authors experiences across a number of uranium and NORM related operations.

[1] <http://www.world-nuclear.org/information-library/safety-and-security/radiation-and-health/occupational-safety-in-uranium-mining.aspx>

[2] IAEA 2014: Radiation protection and safety of radiation sources: international basic safety standards. — Vienna: International Atomic Energy Agency, 2014.

[3] ARPANSA 2005 Radiation Protection and Radioactive Waste Management in Mining and Mineral Processing. Radiation Protection Series. Canberra, Australian Radiation Protection and Nuclear Safety Agency

## Country or International Organization

Australia

**Primary author:** Mr HONDROS, Jim (JRHC Enterprises Pty Ltd)

**Presenter:** Mr HONDROS, Jim (JRHC Enterprises Pty Ltd)

**Session Classification:** Health, Safety, Environment and Social Responsibility

**Track Classification:** Track 10. Health, safety, environment and social responsibility