Australian Government
Australian Radiation Protection and Nuclear Safety Agency

arpansa

Australia's proactive approach to radiation protection of the environment: How integrated is it with radiation protection of humans?

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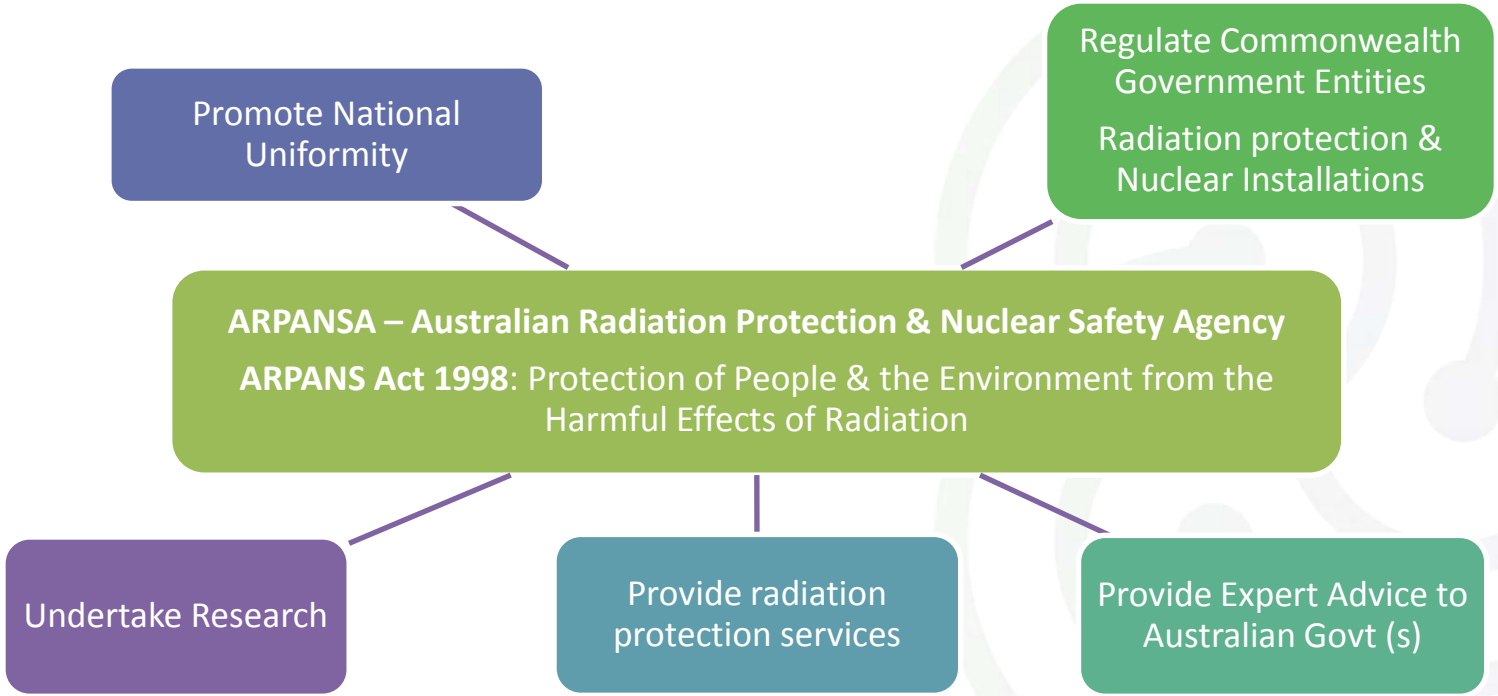
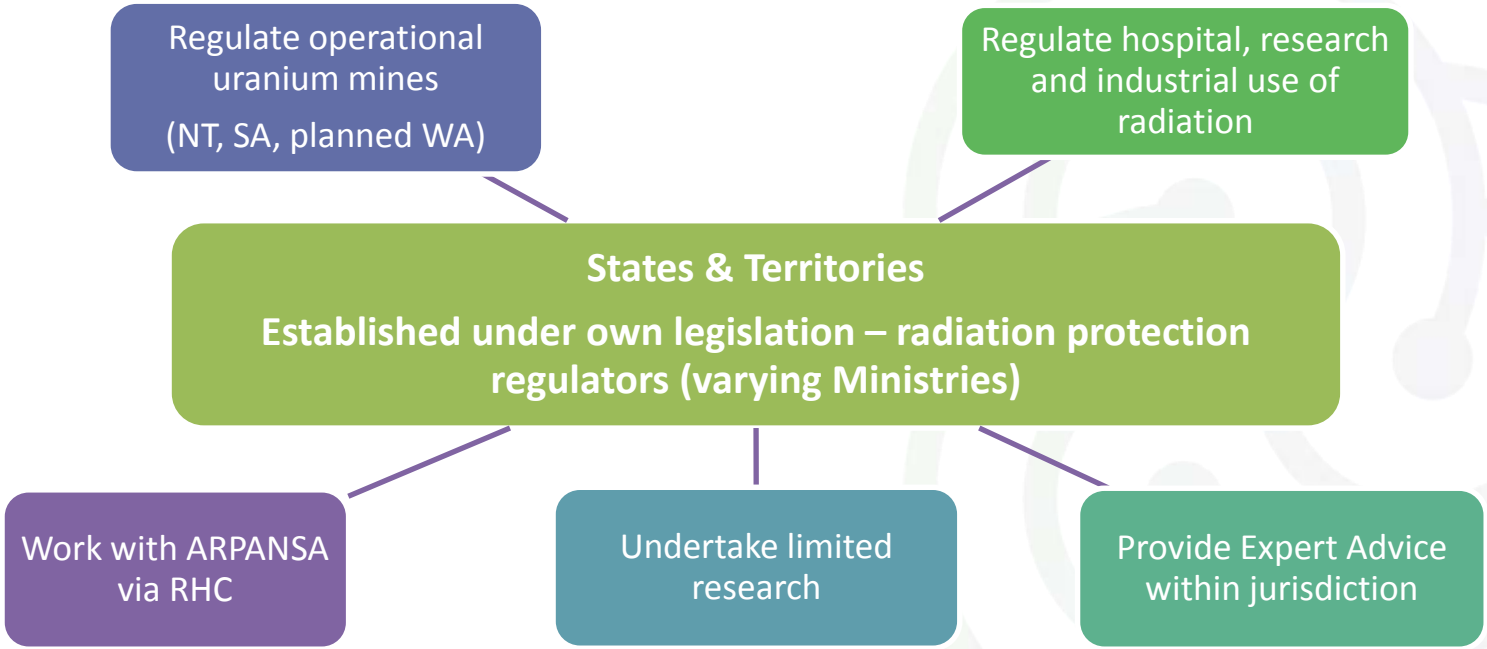
Australian framework for Radiation Protection

- Australia is a federation comprising six states and two self-governing territories and the Federal (or Commonwealth) Government - 9 sets of laws!
- States pre-date Federation, hence Commonwealth has defined powers.
- Responsibility for radiation regulation rests with each jurisdiction.

Australian framework – ARPANSA's role



Australian framework – Jurisdictional roles



Legislative drivers for a proactive approach

Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)

- the **protection of the environment** especially in matters of **national environmental significance**;
- Conservation of **Australian biodiversity**; and
- Enhancing the **protection and management of important natural and cultural places**.

Aligned with the ICRP

- stated aim of *"…preventing or reducing the frequency of such radiation effects to a level where they would have a negligible impact on the **maintenance of biological diversity**, the **conservation of species**, or the **health and status of natural habitats, communities and ecosystems***.

EPBC Act also identifies 9 matters of national environmental significance that includes:

- World heritage properties,
- nationally threatened species and ecological communities, and
- nuclear actions (**including uranium mining**).

Australian Uranium Mining Industry

- Mining in Australia is a significant primary industry and contributor to the Australian economy
- Mining boom early 2000's
- Included uranium mining

Regulation of Uranium Mining

- Exploration and development
  - is regulated under State and Federal reso es industry laws
- Environmental assessment and appro anium mines
  - is conducted under both State a onmental laws
  - final approval resting with t rnment under EPBC Act
- Radiation protectio rs and environment from uranium mining
  - regulated by
  - applies nationa and Guidelines developed by ARPANSA;
  - based on interna ional best practice and principles.

Complex Arrangements

Requirements on Industry

- The Environment Protection and Biodiversity Conservation Act 1999
- Uranium mining triggers nuclear action and requires an Environmental Impact Assessment
- Administered by Commonwealth Department of Environment (DoE)
- ARPANSA advises DoE on radiation protection aspects of any Environmental Impact Assessment
- Expansion of Olympic Dam (2011)
- Ranger Uranium Mine
  - 3 Deeps proposal (2013)
  - Closure and rehabilitation
- New proposals for mining operations in WA
  - Wiluna (2011, 2015)
  - Yeelirrie (2015)
  - Kintyre (2013)

Draft EIS Olympic Dam Expansion 2009

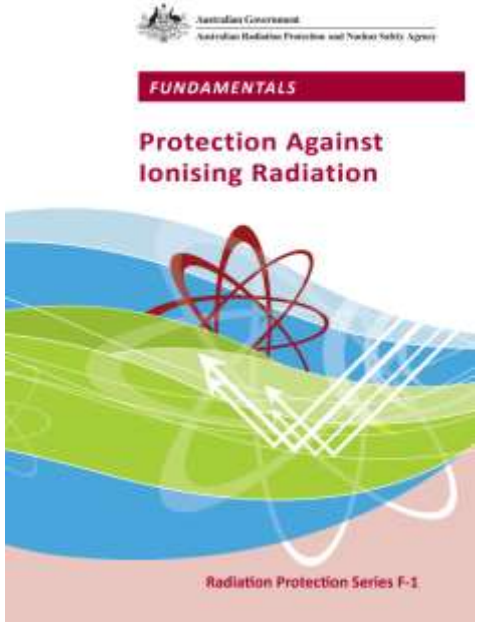
- *"…Recently there has been **increasing awareness of the vulnerability of the environment** and of the need to be able to **demonstrate that it is protected** against the effects of industrial pollutants, including radionuclides. The **ICRP, in its 2007 Recommendations** (ICRP, 2008) has given more emphasis to the protection of the environment. More detailed advice is given in ICRP Publication 91, 'A framework for assessing the impact of ionising radiation on non-human species (ICRP 2003) which reviews the various methods that have been developed for the assessment of radiological impacts with the objective of identifying and suggesting the best framework. It **recommends making an initial assessment using primary (generic) reference organisms for flora and fauna** to give an order of magnitude assessment of the probability and severity of likely effects of radiation exposure on the population……. This approach has been adopted by the European Union as part of its ERICA project…."* (BHP Billiton, 2009).

Development of National Guidance

- In 2008 the Radiation Health Committee led by ARPANSA agreed to update the *Radiation Protection Series* commencing with RPS No 1 to adopt the principles of ICRP Publication 103

- ARPANSA Technical Report 2010 (Doering, 2010) : Reviewed the ICRP framework and ERICA integrated approach for assessment and protection of non-human species and the applicability in an Australian context

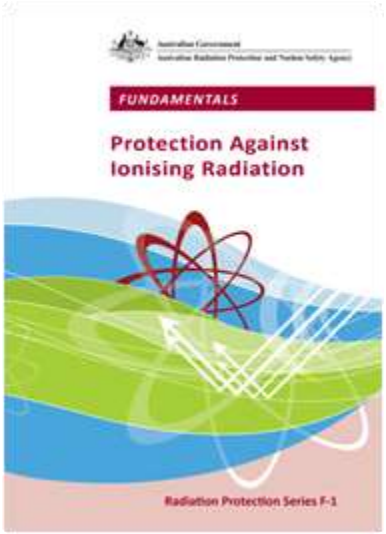
Development of National Guidance

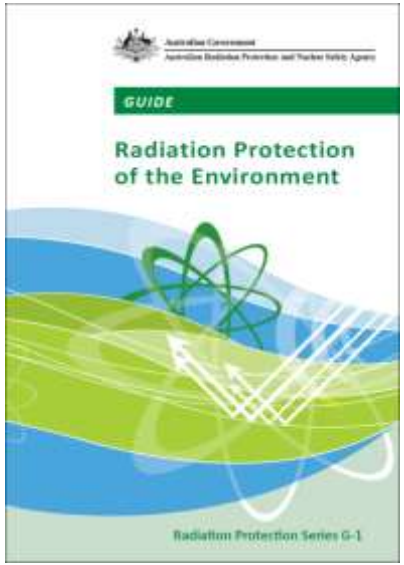


- Fundamentals published in February 2014

"…the exposure of wildlife to all additional radiation sources resulting from human activities. Wildlife may require protection in order to maintain biological diversity, conservation of species, or the health and status of natural habitats, communities or ecosystems, or anything that may be otherwise required from a conservation point of view in accordance with relevant legislation." (ARPANSA, 2014).

Development of National Guidance



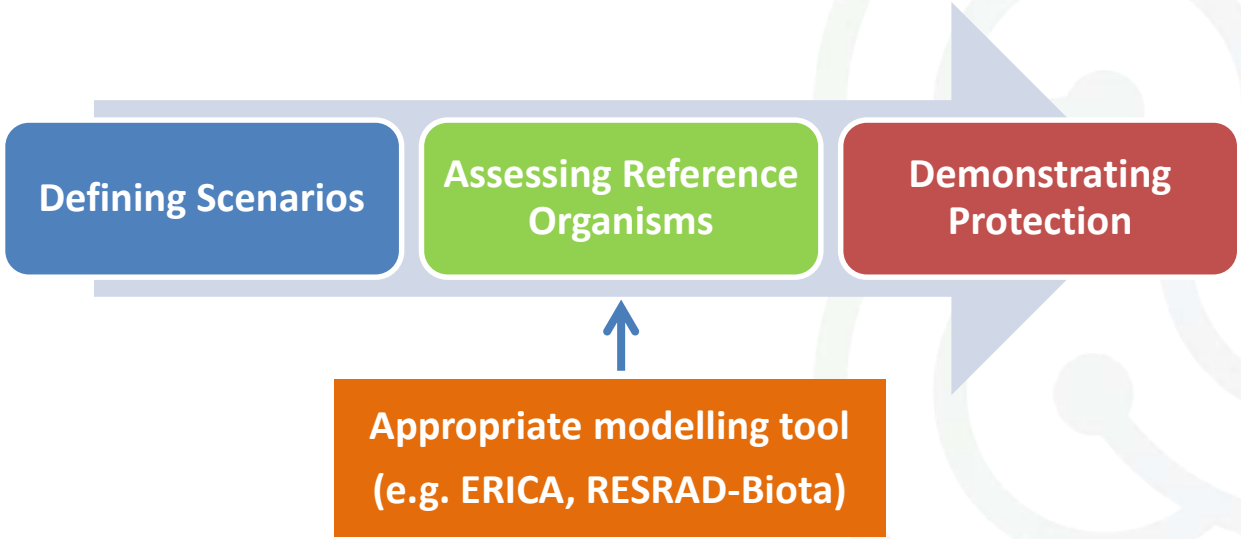


2014 → 2015

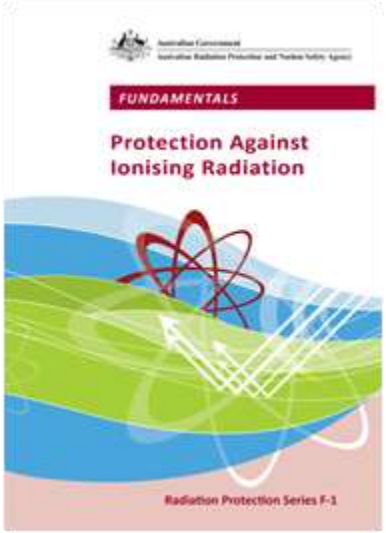
- Guide for Radiation Protection of the Environment published in November 2015
- Developed in consultation with industry, regulators and other stakeholders
- Built on scientific and regulatory developments and outlined the framework for protection of the environment from the harmful effects of ionising radiation and the practical aspects of the process through which protection could be demonstrated.

RPS G-1 Objectives

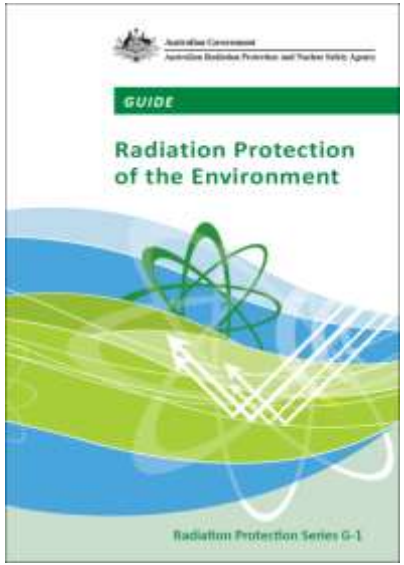
Demonstrate effective level of protection in relation to maintenance of biological diversity, conservation of species, or health of natural ecosystems



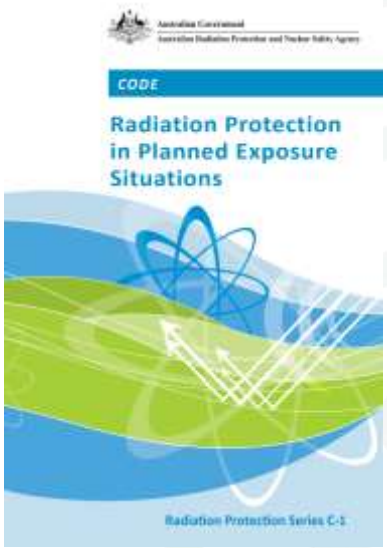
Development of National Guidance



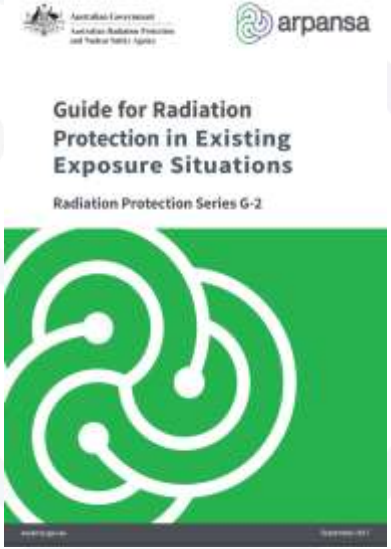
2014



2015



2016



2017

HOW INTEGRATED?

Case Study 1: Alligator Rivers Region

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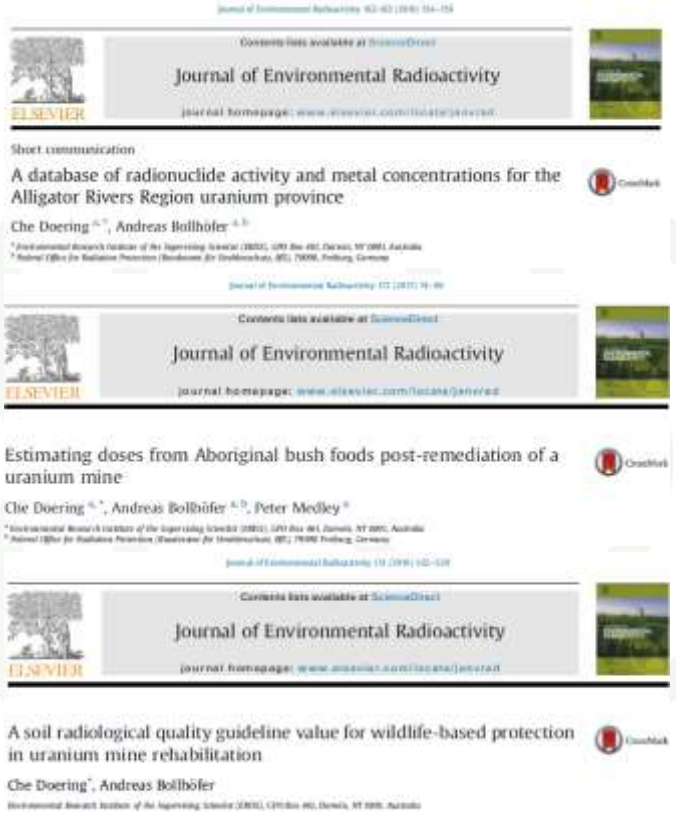
- Environmental Research Institute of the Supervising Scientist (ERISS) have been undertaking research and monitoring since late 1970's

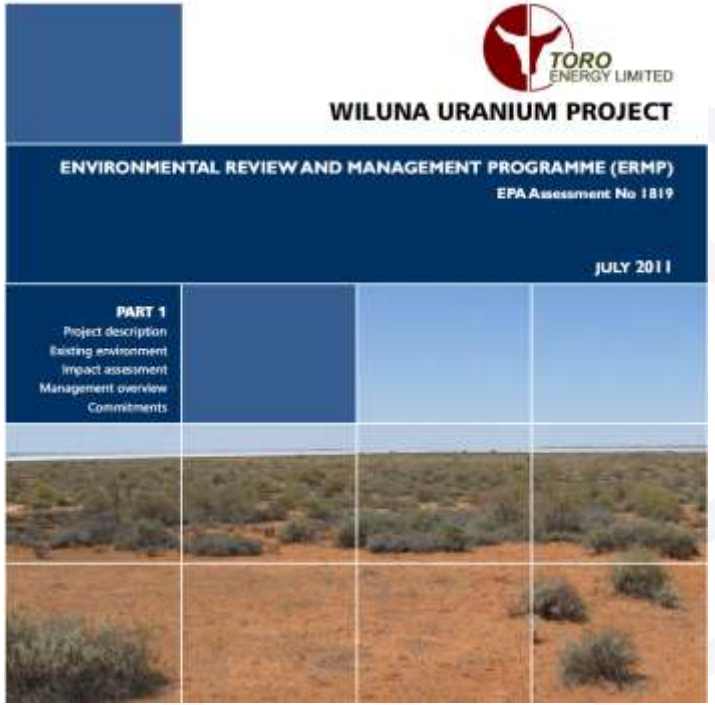
- Established BRUCE database
  - Human dose assessment – focussing on indigenous populations consuming bush foods
  - Environment assessment – impacts on wildlife

- Rehabilitation Standards – protection of humans and environment in preparation for closure of Ranger



Case Study 2: Wiluna Uranium Project

- Assessed risks to human health and non-human species – consistent source terms and an integrated approach (appendix D)
- ERICA tool was applied to assess radiological impacts on non-human species. Major pathway – dust exposures
- Risk of radiological harm negligible for all reference organisms except lichens & bryophytes – highly radiation resistant.



Case Study 3: Yeelirrie Uranium Project

- Public Environmental Review 2015, inc. radiation technical report
- Assessed risks to human health and non-human species – exposures primarily via dust pathways / radon exposure
- ERICA tool and also radon and decay products utilising Vives I Batlle et al. 2012.
- Comprehensive assessment – but did not include micro fauna
- The final project proposal is pending further research into (non-radiological) impacts on diverse stygofauna

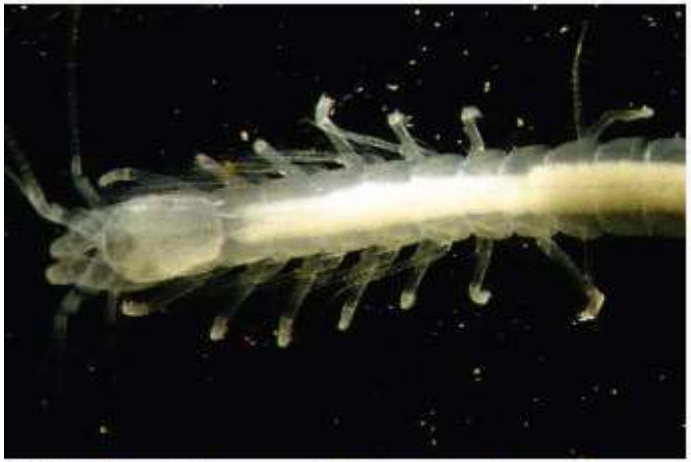


PHOTO: The project poses a risk to some underground stygofauna, WA's environmental watchdog says. (Supplied)

http://www.abc.net.au/news/2017-01-17/yeelirrie-uranium-mine-approval-defended-by-albert-jacob/8189108

Case Study 4: Little Forest Legacy Site

- Licensed by ARPANSA in 2016 as a ‘Prescribed legacy site’.
- Assessments for both human and non-human species undertaken
- Medium and long-term management plan by mid-2018
- Need to address all exposure pathways and apply a graded approach to radiation risks

Future Challenges

Gas and Petroleum Industry

- Environmental legislation is the driver for risk assessment
- Disconnect between making the environmental decision and looking at the impacts on human health in an integrated manner
- Removal of seabed pipelines containing radioactive scales

Future Challenges – Legacy sites


Kylin

Conclusions

- In Australia – significant advancement in demonstrating protection of both people and the environment in impact assessments and during regulatory review, for planned and existing exposure situations
- Cooperative relationship between industry and regulatory authorities
- Australian guidance implemented that has strong support from stakeholders
- Continue to embrace an ‘integrated’ or ‘holistic’ perspective on radiological protection

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THANK YOU

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