



Australian Government

Department of the Environment and Energy

Supervising Scientist

# Australian Department of the Environment and Energy: Environmental Research Institute of the Supervising Scientist (*eriss*)

## Research: Past, present and future directions

Peter Medley

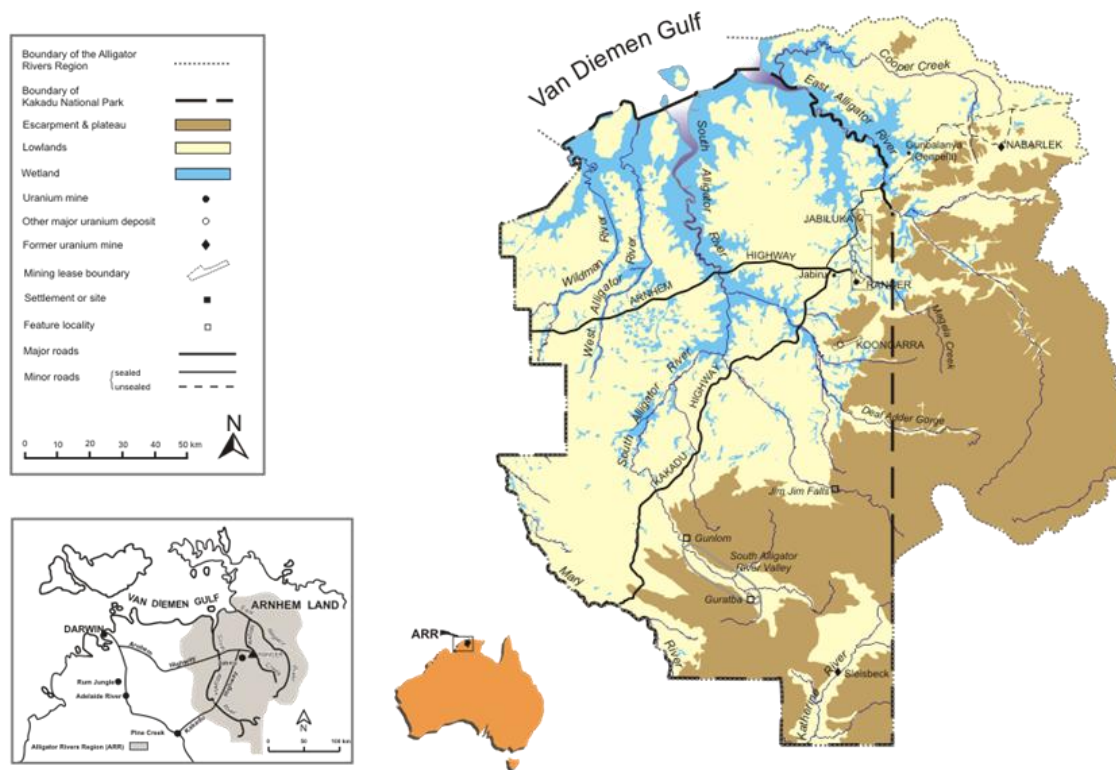
Senior Radiochemist



# Location

- The Environmental Research Institute of the Supervising Scientist – **eriss**
- Located in Darwin, Northern Territory of Australia
- Primary responsibilities are monitoring and researching potential impacts of uranium mining in the Alligator Rivers Region – Ranger Uranium Mine (RUM)

Alligator Rivers Region





# Location

- The region is mostly aboriginal land
- Ranger Uranium Mine is surrounded by Kakadu National Park and will be returned to traditional owners
- The aboriginal diet includes traditional food items





# Rehabilitation standards

- Currently developing RUM rehabilitation standards

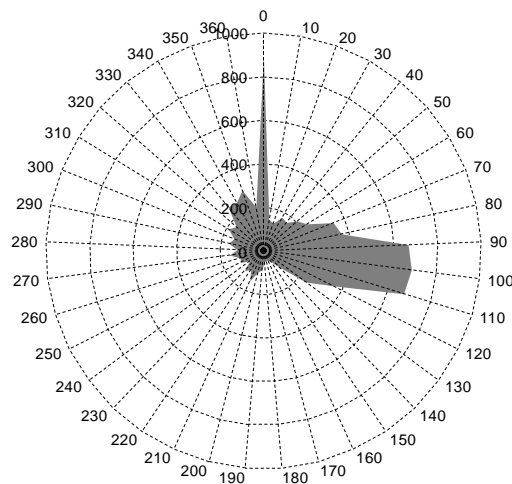


- Developing methods for assessing their achievement.
- For humans the standards are 1 mSv per year dose limit and 0.3 mSv per year dose constraint.

# Assessment methods: Radon flux



- $^{222}\text{Rn}$  flux on waste rock to characterise the  $^{222}\text{Rn}$  source term for the rehabilitated landform
- Modelling atmospheric dispersion of  $^{222}\text{Rn}$  from the rehabilitated landform to determine doses on and in the vicinity of the landform.



# Assessment methods: Ingestion dose

Journal of Environmental Radioactivity 162-163 (2016) 154–159



Short communication

A database of radionuclide activity and metal concentrations for the Alligator Rivers Region uranium province



Che Doering <sup>a,\*</sup>, Andreas Bollhöfer <sup>a,b</sup>

Journal of Environmental Radioactivity 165 (2016) 32–34



Short communication

A tool for calculating concentration ratios from large environmental datasets



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<sup>b</sup> Federal Office for Radiation Protection (Bundesamt für Strahlenschutz, BfS), 79098, Freiburg, Germany

Journal of Environmental Radioactivity 151 (2016) 551–557



Influence of group II metals on Radium-226 concentration ratios in the native green plum (*Buchanania obovata*) from the Alligator Rivers Region, Northern Territory, Australia



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- Radioactivity measurements on traditional foods to determine concentration ratios
- ~35 years of data has been published
- A tool was developed for their analysis: BRUCE database/tool



# Radiochemical methods development

Applied Radiation and Isotopes 95 (2015) 200–207



$^{228}\text{Ra}$  and  $^{226}\text{Ra}$  measurement on a  $\text{BaSO}_4$  co-precipitation source

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<sup>c</sup> Charles Darwin University, Darwin, NT, Australia



**Pb-210  
determination  
using Liquid  
Scintillation  
Counting  
(LSC)**

Peter Medley



- Radium isotopes
- $^{210}\text{Pb}$
- PhD with Australian National University (ANU)
  - Actinium series  $^{231}\text{Pa}$  and  $^{227}\text{Ac}$
  - Major project over the next several years

# Regional Collaboration

- Involved in IAEA EMRAS and MODARIA
- Collaboration with ARPANSA, ANSTO and ANU (only Aust.)
- Focus on RUM rehabilitation and monitoring

Environmental Pollution 196 (2015) 201–213



Contents lists available at ScienceDirect

Environmental Pollution

journal homepage: [www.elsevier.com/locate/envpol](http://www.elsevier.com/locate/envpol)



Predicting exposure of wildlife in radionuclide contaminated wetland ecosystems



K. Stark<sup>a,\*</sup>, P. Andersson<sup>b</sup>, N.A. Beresford<sup>c</sup>, T.L. Yankovich<sup>d</sup>, M.D. Wood<sup>e</sup>, M.P. Johansen<sup>f</sup>, J. Vives i Batlle<sup>g</sup>, J. Twining<sup>f,1</sup>, D.-K. Keum<sup>h</sup>, A. Bollhöfer<sup>i</sup>, C. Doering<sup>i</sup>, B. Ryan<sup>j</sup>, M. Grzechnik<sup>k</sup>, H. Vandenhove<sup>g</sup>

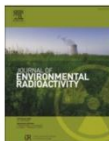
Journal of Environmental Radioactivity 121 (2013) 55–74



Contents lists available at SciVerse ScienceDirect

Journal of Environmental Radioactivity

journal homepage: [www.elsevier.com/locate/jenvrad](http://www.elsevier.com/locate/jenvrad)



The IAEA handbook on radionuclide transfer to wildlife



B.J. Howard<sup>a,\*</sup>, N.A. Beresford<sup>a</sup>, D. Copplestone<sup>b</sup>, D. Telleria<sup>c</sup>, G. Proehl<sup>c</sup>, S. Fesenko<sup>c</sup>, R.A. Jeffree<sup>d</sup>, T.L. Yankovich<sup>e</sup>, J.E. Brown<sup>f</sup>, K. Higley<sup>g</sup>, M.P. Johansen<sup>h</sup>, H. Mulye<sup>i</sup>, H. Vandenhove<sup>j</sup>, S. Gashchak<sup>k</sup>, M.D. Wood<sup>l</sup>, H. Takata<sup>m</sup>, P. Andersson<sup>n</sup>, P. Dale<sup>o</sup>, J. Ryan<sup>p</sup>, A. Bollhöfer<sup>q</sup>, C. Doering<sup>q,r</sup>, C.L. Barnett<sup>a</sup>, C. Wells<sup>a</sup>



# Future work: Radioecological



- Plans for future work
- Biota in the environment
  - Ants, termites, grass
- Small proliferators
  - Phytoplankton
  - Zooplankton
- Actinium series
  - Bush foods, wildlife
  - Environmental media