RESRAD in Australia

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RESRAD training in Australia

A training course on the RESRAD suite of codes was held at Yallambie from **12-16 October 2015**. Two experts in the software, Charley Yu and Dave LePoire, from Argonne National Laboratory, USA, provided the training in **RESRAD (onsite), RESRAD-OFFSITE and RESRAD-BUILD**. The training was provided for approximately 20 participants, with representatives from:

- ARPANSA – including RHS, OCEO and RSB
- state and federal government
- industry
- consulting
RESRAD training in Australia
Example – Maralinga and Oak Valley Assessment (2011)

- Maralinga was the site of British Nuclear weapons testing in the 1950s
- Oak Valley is NW of Maralinga, and his home to an indigenous population
Example – Maralinga and Oak Valley Assessment (2012)

Scenario parameters (generally conservative):

• Dwelling in centre of contaminated zone, with agricultural area adjacent for Maralinga. Dwelling 20km north of the Maralinga zone for Oak Valley.
• Thickness to contaminated zone was 2cm
• Dust loading of 1.5 mg m\(^{-3}\)
• 100% Consumption of locally grown food (except milk) for Maralinga, 10% local food consumption for Oak Valley
• Rate of soil ingestion of 10g per day
• Am241 of 3 kBq m\(^{-2}\) and Pu239 of 21.6 kBq m\(^{-2}\) for Maralinga, Am241 of 0.2 kBq m\(^{-2}\) and Pu239 of 1.4 kBq m\(^{-2}\) for Oak Valley
• For other parameters default values were used
Example – Maralinga and Oak Valley Assessment (2012)

- Dose to 10 yo child estimated at 4mSv in Maralinga, while only 0.03 mSv for Oak Valley
- Highest contributions from dust inhalation and soil ingestion
- Less than the established criteria of 5mSv
- Given the conservative nature of the assessment, confident that the criteria would not be exceeded
Example – Rehabilitation at Ranger Uranium mine

- Assessment undertaken by Department of Environment - Supervising Scientist, who are based in Darwin, NT.
- Modelling the dispersion of radon-222 from a landform covered by low uranium grade waste rock
- RESRAD-offsite was used
- Assess potential doses to local population
Example – Rehabilitation at Ranger Uranium mine

• Mine site is located in NT
• Mining and milling on site for past 40 years
• Current Mine schedule:
  – Cease operations by 2021
  – Remediated by 2026
Example – Rehabilitation at Ranger Uranium mine

• Modelled as a series of 1km x 1km sources
• Based on hypothetical remediated landform, with waste rock used as cover to create the landform
• Weather data for site was collated from many years of data to create STAR file
Example – Rehabilitation at Ranger Uranium mine

- New ICRP 137 dose factors for Radon were used
- Predicted doses for various scenarios
  - Dose increase may be measureable at some population areas, but is within general variations of natural background
  - Not predicted to be above 1 mSv per year for any populations
  - No observable adverse health effects predicted
Example – Proposal for low-level disposal facility (Tellus Holdings)

- Proposal for waste facility in Western Australia
- Low-level radioactive waste
  - Some bulk waste
  - Disused sealed sources
  - Not waste for nuclear fuel cycle
- Chemical waste disposal
- Post-closure assessment used RESRAD-onsite
Example – Proposal for low-level disposal facility (Tellus Holdings)

Scenarios assessed

- Intrusion near the shaft of higher activity
- Intrusion on top of waste
- Living on exposed waste
- Recreational visitor post closure
Example – Proposal for low-level disposal facility (Tellus Holdings)

Results

• Potential large doses for intrusion scenario, particularly if living on top of waste
• Very low dose for recreational visitor

Need for Re-assessment

• Using OFFSITE to predict doses at various distances from exposed/unexposed waste
• Use RESRAD to better inform Waste Acceptance criteria
Future uses of RESRAD in Australia

• Assessment of waste facilities, assist with determining Waste Acceptance Criteria/Activities
  – Tellus holdings – low-level long term disposal
    • Some re-assessment is likely to be required
    • Sandy ridge facility – http://www.tellusholdings.com/project_sandy_ridge.html
    • Have used RESRAD for some aspects of their current proposed facility
  – National Radioactive Waste Management Facility
    • ARPANSA would likely undertake an independent assessment of an application. This may include a RESRAD assessment to look at potential doses to surrounding population
      • https://radioactivewaste.gov.au/
  – Off-shore oil-gas decommissioning
    • Lots of pipes with NORM scale, impact on environment needs to be assessed
Benefits of RAMP

• RESRAD is now part of a greater systematic program in RAMP.
• User groups such as this one
  – Find out what is happening with RESRAD.
• Provides a mechanism for ARPANSA to engage with other users in Australia.
  – RESRAD is used by other state agencies
  – Currently, at least to my knowledge, there is no Australian User group for RESRAD or formal communication between users
• Potential for Australian RAMP meeting (possibly 2021), which would likely include training and sessions on RESRAD
THANK YOU

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