NORM in Mining and Mineral Processing

Practical Considerations for Closure

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NORM in Mining & Mineral Processing

Main industry sectors in Australia affected by NORM:

→ Uranium
→ Mineral Sands
→ Rare Earths
→ Oil and Gas

Other industry sectors:

→ Phosphate and fertiliser
→ Coal
→ Other metals (e.g. tin, copper etc)
→ Building and refractory materials

NORM in Decommissioning & Closure

NORM impacts considered in management of:

→ Health, safety and environment
→ Waste
→ Public perceptions

Key players:

→ Management
→ Planners
→ Radiation Safety Officer
→ Engineers
→ Contractors (project execution)

Final management ideally considered in design
(realistically this is rare)

1. Demolition of decommissioned component

→ Project Aspects:

- → Uranium mining and processing operation
- → Processing plant operational during project
- → Demolition undertaken by contractor
- → Radiation management assigned to contractor

→ Key Lessons:

- → Radiation is one of many hazards; controls should be commensurate with risk
- → Pre-characterisation of waste is critical in costing of projects
- → Site based personnel have a role to play, even when radiation management is contracted out

2. Remediation of site

- → Project Aspects:
  - → Uranium mining and processing operation
  - → Operation ceased 1989; initial remediation completed 1995
  - → Residual contamination identified following completion of previous remediation
  - → Legacy issue incumbent on new lease holder
  - → Environmentally and culturally sensitive location
  - → Radiation management directly contracted by current lease holder
- → Key Lessons:
  - → Incomplete remediation creates a legacy burden for new operators
  - → Remediation standards can change with time, requiring new owners to re-complete work
  - → It's a lot easier to do it right the first time around!

Image Credit: Paulka Radiation and Environment

3. Demolition of processing plant

- Project Aspects:
  - Mineral sands mining and processing operation
  - Operation ceased 2015
  - Fixed contamination identified bound to paint
  - Contaminated, but not SCO or radioactive material
  - Full demolition for remediation to pastoral use
  - Demolition undertaken by contractor
  - Radiation management assigned to contractor

- Key Learnings:
  - Operational monitoring data can assist to manage contamination prior to demolition
  - Characterisation of waste during project planning enables disposal pathways to be established and resourced

4. Assessment of oil field infrastructure

- Project Aspects:
  - Decommissioned sub-sea oil fields
  - Operations ceased 2009 and 2015
  - Infrastructure partially decommissioned, recovered for salvage/disposal
  - Tubulars with minor NORM accretion remain in place pending disposal
  - Comparison of environmental impacts of disposal in situ vs. recovery for disposal on land
  - Radiation assessment commissioned by infrastructure owner
- Key Learnings:
  - NORM impacts may be secondary to other impacts; management should be cognisant of other risks

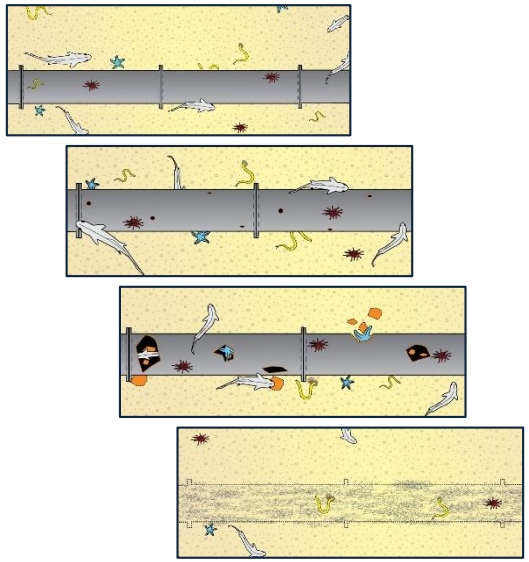

Image Credit: SA Radiation

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Points to consider:

- → Radiation is only one of many hazards associated with decommissioning and closure activities
- → Radiation management in house (where capacity exists) vs. outsourced
- → Waste management pathways are critical and may (will!) require early planning in most jurisdictions
- → Benefits of considering final closure in design phase
- → Flexible and responsive approach for radiation controls in demolition and decommissioning
- → Comparison of environmental impacts of disposal in situ vs. recovery for disposal on land
- → Radiation assessment commissioned by infrastructure owner
- → Controls must be commensurate with risk
- → Graded approach to regulation

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Summary

→ NORM management is an important consideration in costing and resourcing decommissioning/closure projects

→ Waste pathways should be identified and resourced early

→ Radiation management should be cognisant of other hazards