Uranium mining construction and operation

Keith Baldry
Director Mining Radiation and Regulatory Support

IAEA Seminar on Governance of Uranium Production Activities
København Danmark
27-28 May 2014
Authorisations – mining

South Australian Mining Act 1971

• Mining lease
  – Mineral claim
  – Mining lease
  – Retention lease
  – Miscellaneous purposes licence

• Approvals process
  – Mining proposal
  – Program for Environmental Protection and Rehabilitation
  – Process changes
Authorisations – radiation protection

South Australian Radiation Protection and Control Act 1982

• Licence to Carry Out Mining or Mineral Processing (s24)
  – Requires a mining lease

• Staged authorisations following project approval
  – Construction
  – Commissioning
  – Operation
  – Process changes
  – Decommissioning and rehabilitation
  – Relinquishment from regulatory control
RPC Act – authorisation to construct

- An application for authorisation to construct requires:
  - For mining or processing facilities:
    - plans of the proposed mine or processing plant and equipment
    - outline of the operational procedures
    - outline of the Radiation Management Plan for operation
    - engineering controls
    - schedules
  - For Waste Management Facilities
    - Radioactive waste management plan
- Some details might not be finalised, which is why staged authorisations are important
RPC Act – radiation management plan

- Infrastructure and Operations
- Workforce Information
- Radiation exposure and control measures
- Administrative controls
- Radiation monitoring
- Occupational dose assessment
- Transport of radioactive materials
- Personnel and resources
- Education and training

- Risk assessment and control
- Record keeping and reporting
- Quality assurance
- Dose Assessment Methodology
RPC Act – radioactive waste management plan

- Outline of the processes
- Description of wastes
- Description of the environment
- Baseline radiological characteristics
- System for waste management
- Facilities and procedures for treatment, storage and disposal
- Prediction of environmental concentrations and radiation doses to people

- Management practices
- Demonstration that requirements will be met now and in the future
- Monitoring program
- Contingency plans
- Reporting schedule
- Plan for decommissioning and rehabilitation
- Periodic assessment and review

South Australia’s Environment Protection Authority
RPC Act – authorisation to operate

• Pre-requisites for authorisation to operate:
  – facility has been constructed in accordance with authorisations
  – all plant, equipment and procedures required by the approved Radiation Management Plan and Radioactive Waste Management Plan are in place and operational

• Authorisation to operate may be given in stages
  – Initial commissioning phase where monitoring/inspection is relatively intensive
  – If operation is verified within design parameters, then there may be reduced monitoring and inspection for routine operation
  – The results obtained during the commissioning phase would be used to determine ongoing monitoring and inspection requirements
Inspection

Operator competency

- Expertise and resources
- Systems
- Third party audit of management systems
- Junior mining companies
  - Lack of experience
  - Still waiting for profits

Inspections

- Verification of plans being discharged
Monitoring

• The environmental assessment will inform the monitoring regime
• Monitoring undertaken by miner as part of licence conditions
• Duplication of 5% by EPA...
• ...though depending on resource and capability
• Third party verification of modelling, monitoring, reports and management systems
Monitoring

- Groundwater – levels /quantity
- Groundwater – quality
- ISR mining fluid plume verification
- Air – PM10 dust
- Air – radionuclides
- Air – radon
- Tailings integrity
- Soils contamination following spills

Groundwater in the region of the Olympic Dam tailings retention facility
Radionuclides in dust dose assessment
Monthly concentrations of the long-lived radionuclides, $^{238}$U, $^{230}$Th, $^{226}$Ra, $^{210}$Pb and $^{210}$Po, years, are shown in Figure 3.5-2 to Figure 3.5-6. The monthly dust (PM$_{10}$) concentration...
Reporting

- Monitoring
- Incidents
- Progress against plans
- Compliance statements
## Olympic Dam incident summary since 2003

### Olympic Dam mine spill incident summary as reported by BHP Billiton

<table>
<thead>
<tr>
<th>Date of spill</th>
<th>Date reported</th>
<th>Quantity</th>
<th>Description of Incident</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>23 January 2014</td>
<td>24 January 2014</td>
<td>Approximately 1–2 grams</td>
<td>A company officer noticed uranium Solvent Extraction (SX) waste was placed in the incorrect bin in the Processing Waste Transfer Station. On transferring this material several grams of ammonium diuranate spilled onto the hardstand ground adjacent to the waste bins. The company’s investigation identified that waste disposal from the uranium SX was non-compliant with the site’s Waste Management Plan.</td>
<td>The company reported no environmental impacts and no health, safety or radiological impacts to employees or members of the public. A contributing factor to the incident was a gap in awareness of the procedures for waste disposal from the uranium SX area. To prevent a recurrence the company has revised procedures for disposal of uranium SX waste, updated relevant training programs for SX and waste contractors, and further reviewed waste management operations within the processing area.</td>
</tr>
<tr>
<td>9 July 2013</td>
<td>9 July 2013</td>
<td>Approximately 15 grams</td>
<td>A company technician during a routine inspection noticed approximately 15 grams of ammonium diuranate on the ground at two locations within the Solvent Extraction (SX) plant.</td>
<td>The company reported no environmental impacts and no health, safety or radiological impacts to employees or members of the public. The exact cause of the incident was determined to be...</td>
</tr>
</tbody>
</table>
Compliance

We aim to be:
- Strong and fair
- Graded
- Outcome focussed
Compliance

Compliance tools
• Environment improvement programs
• Orders
• New licence conditions
• Prosecutions

Enforcement based on:
• Seriousness of the contravention, for example the nature and extent of the impact
• Extent and speed of remediation action required
• Attitude of regulated entity and compliance history
Problems with compliance

- Legacy licences and conditions including indentures
- Complexity of big mining operations
- Competition for experienced staff
- Regulatory capture in such a small professional field
- Loss of focus for operations staff
- Lack of knowledge can
  - breed conservatism and
  - result in loss of focus on where the real risks lie
OK is not always pass/fail

- Unacceptable
- Improve, or offset
- Minimum
- Acceptable
The realities of compliance & enforcement

- Stopping a mining operation is not like stopping a dry cleaners. The ‘nuclear trigger’ is very seldom used
- For any decent mining company
  - Penalties are meaningless
  - Reputation is everything
- This brings both power and risks
- The regulator needs to be flexible and accept innovation...
  - ...but must understand where the line must be held
  - ...and recognise their role in improvement
- This requires a very high degree of knowledge and ability
- Senior staff need to be able to make these calls (with sufficient knowledge to not be doing deals over the heads of staff that know better)
Thank you

Skillogalee, Clare Valley, South Australia