Mining and Processing Safety and Radiation Protection

A Balance
• Safety is a priority for all mining and processing operations
• Acute and chronic exposure hazards and risks
• Risk management approach:
  – Identify
  – Quantify
  – Control
• Standardised approach (avoid risk prioritisation)
• Control commensurate with the level of risk for all risks
• Limited resources to address issues (money, time, effort)
Mining Hazards

- Collisions
- Chemicals
- Tyres
- Manual Tasks
- Isolation
- Strata Control
- Fires
- Explosions
- Slips, Trips & Falls
- Occupational Health
- Interface
- Outburst
- Ground Control
- Inrush
- Explosives OpenCut
- Explosives Underground
Occupational Health

• Dust (inorganic, silica)
• Diesel exhaust emissions
• Hazardous substances:
  – Gases and vapours
  – Solids and liquids
• Noise, Vibration
• Thermal / heat stress
• Asbestos and synthetic mineral fibres
• Non-ionising radiation (e.g. welding flash)
• Ionising Radiation
What should it control?

- Radon and radioactive dust
- Blasting fumes
- Dust, silica
- Diesel fumes
- Heat
Processing Plant
What should be controlled?
- Working at heights
- Hazardous chemicals
- Moving parts
- Confined spaces...
Overall Reagent Consumption

Sulphur 83500 tpa
HCl (32%) 85000 tpa
Limestone 113000 tpa
Lime 47900 tpa
NaOH (100%) 42000 tpa
Na2CO3 26800 tpa

Question: What is the liquor in back liquor?
## Radionuclide Content

<table>
<thead>
<tr>
<th>Radio Nuclide</th>
<th>Ore</th>
<th>Beneficiation Tailings</th>
<th>Beneficiation Concentrate</th>
<th>Residue Facility Tailings</th>
<th>Carbonate Product</th>
<th>Chloride Product</th>
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<td>Bq/g</td>
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<td>Liquids (Bq/l)</td>
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</table>
Radionuclide Content

Figure 26.6 Radiation flow chart

Radionuclide concentrations:
Based on ore grade of 600-700 ppmU

Key: U238, Th232, Ra226, Pb210, Po210

Tailings retention system

UOC

EW Copper

Silver

Gold

ER Copper
It is not just the Radiation

- Risks in perspective
  - Radiation is one of a number of hazards
  - Controls commensurate with risk
  - Radiation risk well defined

- IAEA
  - Graded approach to regulation
  - Controls commensurate with the risk
  - Understand the risks

- Management Plans
  - Compliance basis
  - Consider all hazards (eg; OHSMP)
  - Must be useful and practical