One Company's Experience with Hearing Loss Prevention: An Overview
Mining Hearing Loss Prevention Workshop - September 26, 2006

Todd Peterson
Senior Health and Safety Advisor
Kennecott Utah Copper
Today’s Presentation

• Introduction to Rio Tinto / Kennecott Utah Copper.
  - Who are Rio Tinto and Kennecott Utah Copper?
  - Kennecott Utah Copper’s Bingham Canyon Mine.

• Hearing Conservation Program at Bingham Canyon.
  - Program Overview.

• Prevention Activities - Controlling the Cab Environment.
  - Rio Tinto Requirements.
  - Purchasing Specifications for new Equipment.
  - In-cab Communication Head-sets.
Who are Rio Tinto and Kennecott Utah Copper?

- Rio Tinto is:
  - A Global Mining Company with over 40 mining operations in North/South America, Europe, Africa, Asia and Australia.

- Kennecott Utah Copper is:
  - Approximately 1,700 employees working at six (6) operating facilities - Bingham Canyon Mine, Copperton Concentrator, Smelter, Refinery, Power Plant and Tailings Impoundment.
  - Four(4) facilities - Bingham Canyon Mine, Copperton Concentrator, Power Plant and Tailings Impoundment are under MSHA jurisdiction.
  - Two(2) facilities- Smelter and Refinery are under Utah-OSHA jurisdiction.
Who are Rio Tinto and Kennecott Utah Copper?

- Kennecott Utah Copper is:
  - A mining company that annually produces approximately:
    - 278,000 tons of copper cathode,
    - 512,000 oz. of gold,
    - 4,200,000 oz. of silver,
    - 17,000 tons of molybdenum,
    - 1,722 tons of lead carbonate,
    - 220 tons of selenium.
Kennecott Utah Copper's Bingham Canyon Mine
Kennecott Utah Copper’s Bingham Canyon Mine

• **Improving Safety Performance:**
  - 738 Mine employees and 150 contractors.
  - Safely producing approximately 550,000 tons of ore and waste rock daily.
  - 58% reduction in LTIFR(2001-05).
  - 84% reduction in AIFR(2001-05).

![](image-url)

**Safety Statistics - Bingham Canyon Mine**

Employees and Contractors

<table>
<thead>
<tr>
<th></th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>AIFR</td>
<td>2.98</td>
<td>2.56</td>
<td>0.73</td>
<td>0.8</td>
<td>0.95</td>
</tr>
<tr>
<td>LTIFR</td>
<td>1.15</td>
<td>1.28</td>
<td>0.12</td>
<td>0</td>
<td>0.48</td>
</tr>
</tbody>
</table>
Hearing Conservation Program at Bingham Canyon
Hearing Conservation Program at Bingham Canyon

• Program Overview:
  
  - **KUCC Occupational Exposure Limits:**
    • 8-hr. shift - 85 dB(A).
    • 12-hr. shift - 82 dB(A).
  
  - **Noise Monitoring:**
    • 3dB(A) Exchange rate.
    • 80 dB(A) Threshold.
Hearing Conservation Program at Bingham Canyon

• Program Overview cont.

- All 738 Mine employees are grouped into six (6) separate Similar Exposure Groups (SEG’s).
  • Mine Operations
  • Field Maintenance
  • Technical Services
  • Truck Shop
  • Utility
  • Administration.

- The largest number of Mine employees reside in the Mine Operations SEG.
  • Of this number (in Mine Operations) - 355 of 463 employees operate haul trucks and/or road equipment.
Hearing Conservation Program at Bingham Canyon

• The Challenge - Hearing Loss Prevention:

  - Average noise exposure to haul truck drivers/heavy equipment operators is 87 dB(A). (with a 95% UCL of 94 dB(A))

  - Contributors to the noise levels in the operator’s cab include:
    • Equipment operation - engine noise, equipment function.
    • Overall condition and age of equipment - noise dampening considerations/door window seals, etc.
    • Windows- condition and status - up or down.
    • Radios - Two-way radio communications & AM/FM/satellite radio.
Hearing Conservation Program at Bingham Canyon

• The Challenge - Hearing Loss Prevention:

- Haul trucks - under “normal” operating conditions the noise level in a cab of a Caterpillar or Komatsu haul truck is typically at 79-80 dB(A).

- Additional sources of noise inside the cab significantly increase the operators measured exposure...

  • to hear the AM/FM radio above the established background noise levels - the volume is typically set above 80 dB(A).
  • for effective communication with Mine production control, the two-way radio is now adjusted to decibel levels above the AM/FM radio
  • cab windows down for personal preference and/or AC performance.
Hearing Conservation Program at Bingham Canyon

• The Challenge - Hearing Loss Prevention:

  - Effects of Additional Noise Sources:
    • Cab - 79 dB(A)
    • AM/FM radio - 82 dB(A)
    • Two-way radio - 84 dB(A)

  Total SPL = \(10 \log \left( \sum_{i=1}^{3} 10^{79/10} + 10^{82/10} + 10^{84/10} \right) = 86.8 \text{ dB(A)}\)
Prevention Activities - Controlling the Cab Environment.
Prevention Activities – Controlling the Cab Environment.

• Rio Tinto Requirements
  - In 2004 Rio Tinto established global health targets for noise reduction to reduce the risk of NIHL.
    • 20% reduction in the number of employees exposed to noise levels above 85 dB(A) – TWA.
    • No employee exposed to noise above 82 dB(A) – TWA, with regard to HPD’s
  - To meet this target, KUCC has established a yearly reduction target of 5% to align with the 20% reduction specified by Rio Tinto by 2008.
Prevention Activities – Controlling the Cab Environment.

- Purchasing Specifications for new Equipment
  - Rio Tinto has established HSE specifications for mobile equipment including performance based criteria for limiting noise exposure.
    - 80dB(A) sound level limit at the operator's ear position based on an exposure time of 12hrs.
    - The sound level limit shall be achieved with equipment under power with the doors and windows closed, and in-cabin radios turned off.
    - Equipment manufacturer shall provide certificates of compliance at commissioning.
Prevention Activities – Controlling the Cab Environment.

- Upgraded single pane / locking window design
- Enhanced door closing mechanism & seals
- Noise dampening materials

Typical Dozer Cab

Upgraded Dozer Cab
Prevention Activities – Controlling the Cab Environment.

- **Cab Communications - Headsets**
  - Headsets are designed for a single operator, are attached to a receiver box that limits noise level output (to the operator) to a maximum of 82 dB(A).
  - Inputs include the Two-way & AM/FM/satellite radios to the receiver and sources of ambient noise to the headset.
Cab Communication Head-sets: System Diagram

Two-Way Radio

Input

AM/FM/Satellite Radio

Input

Receiver Box

Power Cable

Ambient Noise

Special Headset
In Cab Communication: Head-sets

- Push to Talk Button
- Gel/foam Filled Ear Pads
- Active Listening Devices

Peltor

David Clark
Prevention Activities – Controlling the Cab Environment.

- **Cab Communications – Headset Program at Bingham Canyon.**
  
  - David Clark and Peltor Headset Systems are installed in four (4) haul trucks – Caterpillar and Komatsu.
  - Approximately Twenty-five (25) haul truck drivers have worn the headsets and participated in the evaluation program.
  - Technical and personal preference issues have impacted headset performance.
  - The current round of headset performance testing is scheduled through September.
  - Next step: Formalize results of the headset evaluation, identifying modifications and determine the feasibility of outfitting the heavy equipment fleet.
Questions ?