Case Studies of Noise Controls to Reduce Exposure

by

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Metal/Nonmetal Success
Story - #1
Underground operation
Background information:

- Operator full shift exposure: 213%
- Equipment involved: Tamrock Toro LHD
During rebuild, home-made cab installed with acoustical treatment
Overall view of cab exterior
Interior view of ceiling materials.
Interior view of door panel treatment
Interior view of side wall treatment
Interior view of floor treatment
Follow-up Investigation

- Baseline full shift exposure: 213%
- Full shift exposure: 14.43%
- Average Sound Level in cab during work cycle – 82.2 dBA
- Cost - unavailable
- Noise citation terminated!
Coal Success Story - #2
Underground Operation

- Diesel Powered Rail Mounted Man Bus
Old Design – Air Vents
New Design – Air Vents
Old Design- passenger compartment
New Design – passenger compartment
Compartmental Acoustical Treatments
Noise Spectra Comparison

Operator Compartment

One-Third Octave Band Frequency In Hz

Sound Pressure Level In dBLin

Old Design (99.5 dBA)  New Design (92.5 dBA)
Noise Spectra Comparison

Passenger Compartments

One-Third Octave Band Frequency In Hz

Sound Pressure Level In dB LIN

Old Design (96.3 dBA) - New Design (89.1 dBA)
## Noise Exposure Data

<table>
<thead>
<tr>
<th>Condition</th>
<th>Travel Time (Minutes)</th>
<th>Operator Position</th>
<th>Personnel Compartments</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>90 dBA Threshold</td>
<td>Front Compartment</td>
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<tr>
<td></td>
<td></td>
<td>Dose %</td>
<td>L&lt;sub&gt;avg&lt;/sub&gt;</td>
</tr>
<tr>
<td>Old Design</td>
<td>Avg 30.2, SD 4.7</td>
<td>17.7</td>
<td>96.4</td>
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<tr>
<td></td>
<td>Avg 26.2, SD 1.0</td>
<td>6.3</td>
<td>90.8</td>
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<tr>
<td>New Design</td>
<td>Avg 30.2, SD 4.7</td>
<td>1.3</td>
<td>1.5</td>
</tr>
<tr>
<td>Difference</td>
<td>Avg 4.0, SD 1.3</td>
<td>11.3</td>
<td>5.6</td>
</tr>
</tbody>
</table>

**Cost ~ $97,000**
Metal/Nonmetal Success
Story - #3
Background information:

- Driller full shift exposure: 486.7%
- Equipment involved: Tamrock SD600 Slot Drill
As part of the evaluation, an operator control barrier was installed on the drill.
Another view of the operator control barrier
In addition to the operator control barrier, a three-sided portable enclosure was also evaluated.
Another view of the three-sided portable enclosure
Results of evaluation in terms of full shift exposures

- Baseline: 486.7%
- Drill with operator control barrier: 354.9%
- Drill with operator control barrier and three-sided portable enclosure: 144.4%
- In addition, the Lavg at operator position was reduced from 101.4 dBA to 92.7 dBA!
- Cost less than $1,000
Summary

• Engineering and/or administrative controls can be successful in significantly reducing or abating overexposures to noise.