Workplace Noise Surveys:
A Hands-On Measurement Workshop

Presented by:

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Session Description: This hands-on workshop will be of particular interest to anyone considering conducting their own workplace noise surveys, or, simply looking to gain a better understanding of the instruments and types of measures. Participants will be introduced to the basic operating procedures of common instruments and get an opportunity to use the meters to acquire spot-check and/or short-term dosimetry measures on a variety of noise sources or events. The results will be generally discussed in the context of compliance requirements, including evaluation and selection of appropriate hearing protection and common elements of a hearing conservation program.
Workplace Noise Survey: “Hands-On”

Training Topics & Objectives:

Brief Introduction
1. Introduction to workplace noise.
2. Ensure awareness of the compliance requirements.

Noise Survey Workshop: Recognition, Evaluation & Control
3. Define & explain basic terms used in workplace surveys.
4. Identify & describe measurement instruments.
5. “Hands-on”. Practical workshop.

Hearing Conservation Programs (HCP)
6. Describe various strategies for noise control.
7. Evaluate/select PPE based on workshop data & examples.
8. Identify common elements of a workplace HCP.
Introduction: Sound Pressure Level (SPL)

Unbearable
Single exposure may cause deafness

Deafening
Extreme discomfort

Painful
Pain threshold for most people

Very high
Prolonged exposure may damage hearing

Moderate
e.g. quiet office

Very low
scarcely audible

Introduction: Sound Pressure Level (SPL)
Question... Is a noise survey a compliance requirement in Ontario? Yes or No? Support your answer.

PSST... Where is the “noise” presently covered in our green books?
Introduction: Health & Safety Effects of Noise

Noise-Induced Hearing Loss (NIHL)

Tinnitus

“It’s a constant ringing in my ears. When I try to ignore it, they leave a message.”
Workshop: Noise as an OH&S Hazard/Risk

A Classic H&S Approach:

Recognition → Evaluation → Control
Recognition: Basic Terms

Three Types of Noise:

- Continuous
- Impact and Impulse (< 1 second duration)
- Intermittent
• To gather data on actual employee exposures
• To prevent hearing loss & other health effects
• To determine compliance status with Ontario Noise Regulations
• To improve worker morale, productivity, work quality, concentration, communication interference
• To ensure appropriateness of HCP
• To determine the need for noise control strategies

Refer to Workshop Materials
Evaluation: Measurement Basics

Types of Workplace Surveys:

- Screening Survey
- Compliance Survey
- Engineering Survey

Types of Common Instruments:

- Sound Level Meter (SLM)
- Noise Dosimeter
- Octave Band Analyzer
Sound Level Meter (SLM):

- “spot check” measurements
- noise mapping (contour maps)
- noise source identification
- octave band analysis
- preliminary estimates of worker exposure
Dosimeter:

- “Time-weighted average” (TWA) exposures
- Measurement of variable sound sources
- Record of maximum & minimum values
- Useful if worker is not stationary during shift
Some Technical Considerations:

- Type of SLM
- Frequency Weighting Filters
- Exchange Rates
- Time Constants (Slow/Fast Response)
- Octave Band Analyzers
# Evaluation: Measurement Basics

## Sample SLM Data: Point-in-time Noise Levels

<table>
<thead>
<tr>
<th>Activity</th>
<th>Ambient Noise Level (dB(A))</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tack Welding</td>
<td>89</td>
</tr>
<tr>
<td>Airgun in use</td>
<td>92</td>
</tr>
<tr>
<td>Air-powered screwgun in use</td>
<td>98</td>
</tr>
<tr>
<td>Hammering</td>
<td>95</td>
</tr>
<tr>
<td>Impact gun in use</td>
<td>99</td>
</tr>
<tr>
<td>Grinder in use</td>
<td>97</td>
</tr>
<tr>
<td>Shredder (operating)</td>
<td>90-100</td>
</tr>
<tr>
<td>Baler (operating)</td>
<td>87-96</td>
</tr>
</tbody>
</table>
Evaluation: Measurement Basics

Plant Mapping:
## Evaluation: Measurement Basics

Sample Dosimetry Data: $L_{eq}$ to $L_{ex,8}$:

<table>
<thead>
<tr>
<th>Activity/Job</th>
<th>“Old” $L_{avg}$ (dB(A)) (5 dB ER)</th>
<th>“New” $L_{eq}$ (dB(A)) (3 dB ER)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Automotive Assembly</td>
<td>74</td>
<td>81</td>
</tr>
<tr>
<td>Automotive Assembly – spray booth</td>
<td>87</td>
<td>89</td>
</tr>
<tr>
<td>Conduct Instrumental Music Classes</td>
<td>83</td>
<td>87</td>
</tr>
<tr>
<td>Conduct Construction Classes</td>
<td>86</td>
<td>88</td>
</tr>
<tr>
<td>Tool &amp; Die Maker</td>
<td>73</td>
<td>80</td>
</tr>
<tr>
<td>Lift Truck Driver</td>
<td>87</td>
<td>89</td>
</tr>
<tr>
<td>Press Operator</td>
<td>87</td>
<td>88</td>
</tr>
</tbody>
</table>
Figure 1: Noise Levels (dB(A)) from personal dosimetry vs. Ontario MoL Compliance Criteria

Figure 2: Noise Levels (dB(A)) from personal dosimetry vs. NIOSH Recommended Criteria

“Old versus New” How They Compare…
Controlling/Reducing Noise Exposure:

- At source
- Acoustic-engineering
- Encapsulation
- Hearing protector

AIM TO CONTROL NOISE AT SOURCE
Controlling Noise under Ontario noise regulation:

- HPDs… “last resort”
- Determine feasibility of engineering controls for noise >85 dB(A)
- Warning signs

- Hearing Conservation Program
Control: HCP

Administrative Controls:

- Limit exposure time (job rotation, expansion …)
- Preventive maintenance program
- Develop noise spec’s for purchase of new equipment
Hearing Protection Devices (HPD’s):

- Less protective than ratings due to improper selection, poor fit, deterioration, user discomfort, lack of user motivation.
- Only used as a last resort to control noise exposure
- Advisable for exposures to sound levels above 80 dbA
- HCP must include training on proper selection, use & care of HPD’s
Hearing Protection Devices (HPD’s):

- Plugs or Earmuffs or Dual Protection?
- CSA Class
- Noise Reduction Rating (NRR)
- Single Number Rating (SNR)
- Other (e.g. new developments)
e.g. Derating Noise Reduction Ratings (NRR’s):

- To account for “real world” conditions, NIOSH recommends:
  - ear muffs: = labeled NRR x 0.75
  - foam & custom earplugs: = labeled NRR x 0.5
  - all other earplugs: = labeled NRR x 0.3

- Also, to account for the C to A adjustment (assuming workplace data is A-weighted), NIOSH recommends that the effective A-weighted noise level is:
  \[ ENL = \text{dBA} - (\text{derated NRR} - 7) \]
A NRR Example:

• Workplace Noise exposure level (unprotected): 94 dB(A)
• Hearing Protection: ear muff with NRR of 32

Derated earmuff (labeled NRR x 0.75):
32 x 0.75 = 24 (dB of protection)

\[
\text{ENL} = \text{dB(A)} - (\text{derated NRR} - 7)
\]
\[
\text{ENL} = 94 - (24 - 7) = 77 \text{ dB(A)}
\]

The effective noise level that a person wearing these muffs is exposed to is 77 dBA
Warning Signs:

Content of signs may include, but is not limited to:

- Identification of actual sound level in dB(A)
- Warning of hazardous sound levels
- Requirement for mandatory hearing protection in area
- Allowable exposure duration for this area, without HPD
- Icons indicating that hearing protection is to be worn
- Other form of controls required
HCP Elements Should Include:

Routine Measures/Surveys of Employee Exposures

In concert with…

- Audiometric Testing
- Engineering & Administration Controls
- Training
- Documentation & Program Evaluation

To ensure compliance with the new H&S requirements!
To reduce potential for NIHL & WSIB claims!
Q & A ...

Thank you...

On behalf of:

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