

Audiology Online

Management of Hearing Loss Prevention in Live Entertainment

Robert M. Ghent, Jr., Au.D.

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Recording

INCLUDING: CONCERT SOUND

54,000 WATTS OF AUDIO POWER

105 dB SPL AT ONE MILE

200,000 SATISFIED ROCK FANS

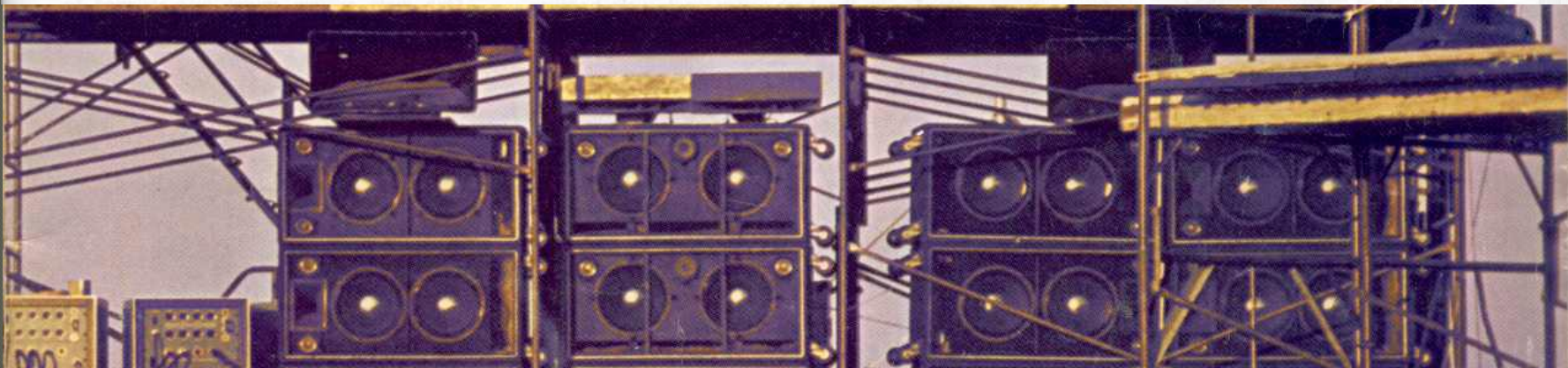
CONCERT SOUND REINFORCEMENT



AND

'THE CALIFORNIA JAM'

BY WAYNE YENTIS



Problem Statement

As an industry, live entertainment is aware of their occupational noise issues, but...

- Hearing conservation has never been a part of the culture
 - Risky behaviors are part and parcel of rock and roll
- They're nescient with respect to industrial regulations
- Industrial regulations don't fit this industry
- ◉ The duty holders tend to get defensive
 - The industry needs to be pro-active
 - The industry understands their noise exposure issues better than anyone
 - Unique work environment, different from other industries
- ◉ What can be learned from others' experiences?
 - How do we avoid industrial-style regulation in this industry?

Industry Differences - Labor

Traditional Industry

- Labor
 - Worker
 - Supervisor
- Health, Safety & Environment
 - Safety Director/Engineer
 - Occupational Audiologist
 - Industrial Hygienist
 - Occupational Nurse
 - Environ. Health Specialist
- Management
 - General/Site management
 - Executive leadership
 - Corporate officers

Live Entertainment

- Talent
 - Musicians
 - Dancers
 - Actors
 - Production
 - Gaffers
 - Riggers
 - Carpenters
 - Pyrotechnics
 - Audio
 - Lighting
 - Venue
 - Promoter
 - Sponsor
 - Security
- } Stage Crew
- } Tech Crew

Industry Differences - Management

Traditional Industry

- One lead at a worksite is responsible for
 - Fall prevention
 - Electrical hazards
 - Respiratory pollutants
 - Crushing and falling objects
 - Site security
 - Noise hazards & hearing conservation
- Defined reporting hierarchy, one vertical line of authority
- Fixed work site, stable environment

Live Entertainment

- Each trade is autonomous, with their own
 - Management
 - Safety procedures (if any)
 - Line of authority
- Reporting hierarchy for an event is often loosely defined
- Work site can be a moving target

Who is ultimately responsible for worker safety?

US vs. EU – Regulatory Environment

US Regulations for Live Entertainment

- Laissez-faire
 - No understanding of industry
 - No resources or stomach for handling complexities
- Reactive (post-incident)
 - Injury/death spurs response
- Default enforcement template
 - Modification/accommodation requires lobbying, legislation, litigation.
 - No guidance
 - Relies largely on self-policing

EU Regulations for Live Entertainment

- Involved
 - Concern for worker safety
 - Concern for business impact
 - Concern for product quality
- Proactive
 - Prevent injury
- Listens to and works with constituents
 - Acknowledges complexities
 - UK-HSE - *The Event Safety Guide: A Guide to Health, Safety, and Welfare at Music and Similar Events* (2nd ed.)

US vs. EU – Noise Standards

US OSHA Noise Standard

- Action Level
 - 85 dBA (50% dose)
 - *Must provide HPDs*
- Maximum Exposure Levels
 - 90 dBA (100% dose)
 - 115 dBA, cont. < 15 min
 - 140 dBPeak
 - *Must wear HPDs*
- Exchange Rate
 - 5 dB
- “Permissible Exposure Level”
 - 8-hour time-weighted avg.
 - Daily exposure
 - 100% daily noise dose

EU Directive Noise Standard

- Exposure Action Values
 - Lower: 80 dBA, 135 dBPeak
 - *Must provide HPDs*
 - Upper: 85 dBA, 137 dBPeak
 - *Must wear HPDs*
- Exposure Limit Values
 - 87 dBA, 140 dBPeak
- Exchange Rate
 - 3 dB
- “Noise Exposure Level”
 - 8-hour time-weighted avg.
 - $L_{EX,8h}$
 - Daily or weekly exposure
 - No concept of noise dose

US vs. EU – Implementation

- EU adopted a collaborative model
 - “What can we learn from this industry?”
 - “What can the industry learn from us?”
 - Working Groups
 - Away from compliance, toward collaboration
- OSHA perceived as—and has been—heavy-handed
 - Unrealistic expectations
 - Unrealistic economic and administrative burdens
 - Problematic for Music Industry

But OSHA is changing its approach...

OSHA in the US

● OSHA's Perspective: OSHA has no teeth

- Dr. David Michaels, Assistant Secretary of Labor; Director, OSHA:
 - Fines too small...not an adequate deterrent.
 - House Subcommittee on workforce Protections, 16 Mar 2010: "...violations...should be felonies. Nothing focuses attention like the possibility of going to jail."

Source: <http://www.palmbeachpost.com/news/osh-head-fines-too-small-to-protect-entertainment-722933.html>

● Industry Perspective: OSHA is heavy-handed

- Dr. Michaels again, June, 2012:
 - "Safety can be profitable"
 - "Goal should be 'culture of safety' not compliance"
- "Not about zero injuries; rather, zero at-risk behaviors."

Source: ASSE Conference, June 2012; Dr. David Michaels' keynote address.

You're Not the Boss of Me

- ◉ In live entertainment, the “talent” reigns
 - Egos with phenomenal cosmic power
 - Insulation, immunity, impunity
 - Historical precedence
- ◉ OSHA has an “industrial” view
 - Doesn't recognize the artist as the boss
 - Entertainment is a “multi-employer” work site.
 - OSHA can hold several entities culpable
- ◉ Some examples
- ◉ How the EU deals with management issues
- ◉ Culture change
- ◉ Best Practices



Photo: Public domain

The OSHA \$100,000 Club

- Incidences involving occupational hearing loss
- American Felt and Filter Co.
 - 35 safety violations
 - Including **exposing workers to hazardous noise**
 - *\$146,300 penalty*
- Exel, Inc. (operates distribution center for Hershey)
 - 9 safety violations
 - **Failure to develop and implement an effective hearing conservation program**
 - *\$283,000 penalty*
- American Marazzi Tile, Inc.
 - 25 safety violations
 - Including **exposing workers to excessive noise levels**
 - *\$318,000 penalty*

Epic Fail

- Sugarland stage, Indiana State Fair, 13 Aug 2011
- 7 deaths, 58 injured
- OSHA cited 3 entities, penalties of \$80,800
 - International Alliance of Theatrical Stage Employees
 - Indiana State Fair Commission
 - Mid-America Sound Corp.
 - \$63,000 penalty
 - Failure to develop & implement Operations Mgmt. Plan
 - Failure to develop risk assessment plan
 - Failure to maintain, document, & use current engineering calculations
 - Failure to provide appropriate, qualified supervision

Source: <http://www.prosoundnetwork.com/article/fines-fly-for-sugarland-stage-roof-collapse/14581>

- All entities indicated the artist was in charge
- *The artist was not cited by OSHA*

How OSHA Sees it

- In the wake of worker deaths in Florida entertainment venues (Sea World, Walt Disney World, and Kravis Center, and now the Indiana State Fair), Dr. Michaels said he is,

“...calling out the entertainment industry for...lax safety standards. ...safety is often not considered the highest priority....”

Source: <http://www.palmbeachpost.com/news/osha-head-fines-too-small-to-protect-entertainment-722933.html>

What impact will this have on hearing conservation in this industry? Recall the OSHA \$100,000 Club.

Failure Is a Management Issue

- ◉ Who is responsible for the sound levels at a concert?
 - The audio engineer who has his fingers on the faders?
 - Who controls the volume of the audience?

The audio engineer on a major tour is told by the band's lead guitar player, "If I can't hear the house sound system when I'm on stage, it's not loud enough."

You're a club owner. You've installed a device that cuts audio power when the DJ gets too loud. You've never had a single complaint from any of the neighbors. But one day you're blindsided by a Worker's Compensation claim for a barista's occupational hearing loss.



Photo: Public domain

The EU Gets Busy

- EU Directive on Physical Agents (Noise)
 - Live Entertainment singled out as a special case
 - Collaborative model
 - “What can we learn from this industry?”
 - “What can this industry learn from us?”
 - Working Groups comprised of stakeholder organizations
 - Education and cooperation, not heavy-handed
 - Proactive (preventive) rather than reactive (post-incident)
 - Time to implement
- UK Event Safety Initiative
 - *The Event Safety Guide: A Guide to Health, Safety, and Welfare at Music and Similar Events* (2nd ed.) – HSE
 - a.k.a. “The Purple Guide”
 - Hearing loss prevention important and integrated

Working Groups

● Members of various Working Groups

• UK

- Acoustical consultants
- Association of British Orchestras (ABO)
- Audiologists
- British Beer & Pub Association
- Chartered Institute of Environmental Health
- Concert Promoters Association
- Ministry of Defence
- National Event Safety Association
- Royal Opera House
- Theatrical Management Association
- Theatrical and musicians unions

• Canada

- Audio Engineering Society
- Audiologists
- Canadian Actors' Equity Association
- Pacific Music Industry Association
- The Dance Centre
- Vancouver Symphony Society
- Vancouver Musicians' Association, Local 145, AFM

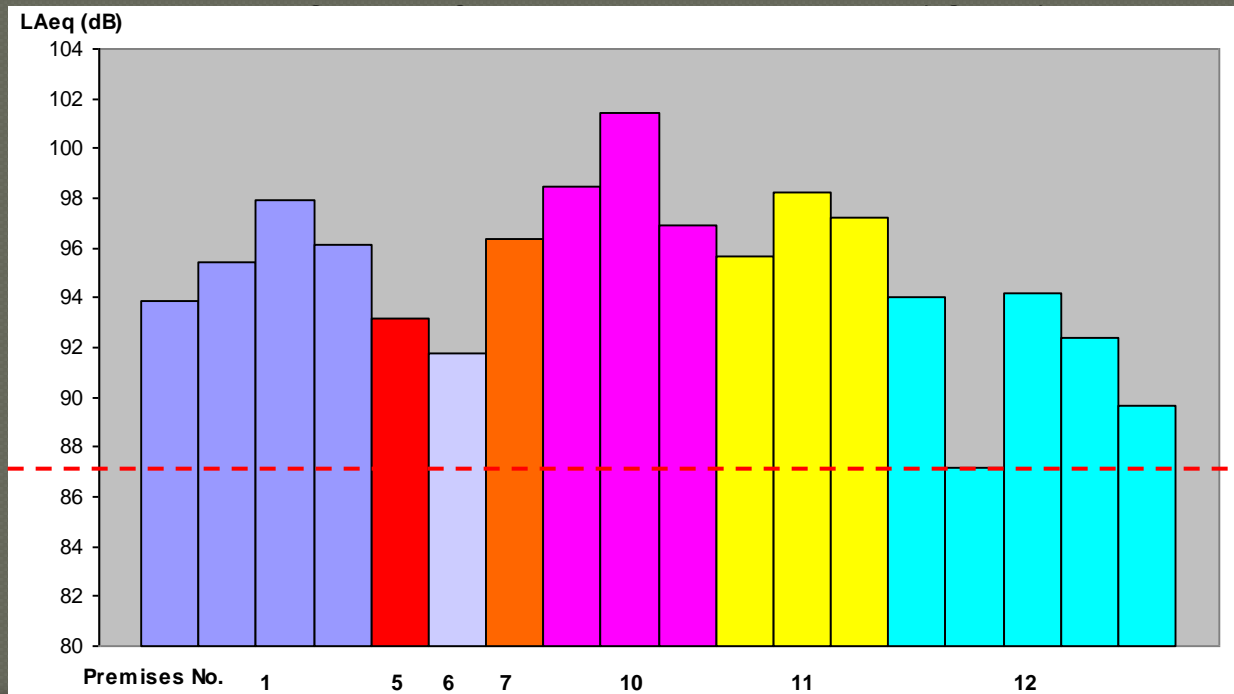
British Orchestra Experience

● ABO-published studies

- Funded by the Arts Council of England, the Musicians Benevolent Fund, the EU, the Musicians Union
- *A Sound Ear I & II*
 - Explore issues of noise damage to hearing in orchestras
 - Impact of Control of Noise at Work Regulations 2005
 - In anticipation of 2008 requirements
- Findings:
 - Hearing conservation is a core management function, must become a part of the daily culture of the orchestra, requires permanent behavioral changes
 - Prevent avoidable harm rather than consolation after damage is done
 - Attitudes are changing; willingness to cooperate & find solutions; directors trying alternate seating, rehearsal level & schedule, admin. controls; musicians wearing HPDs when appropriate. Not perfect, but all on same page.

Kent Community Initiative

- Canterbury District, Kent, England
 - 12 establishments (7 nightclubs, 5 public houses)
 - Dosimetry and sound level measurements
 - Owners/operators concerned with nuisance ordinances
 - Half lacked knowledge of Noise at Work regulations

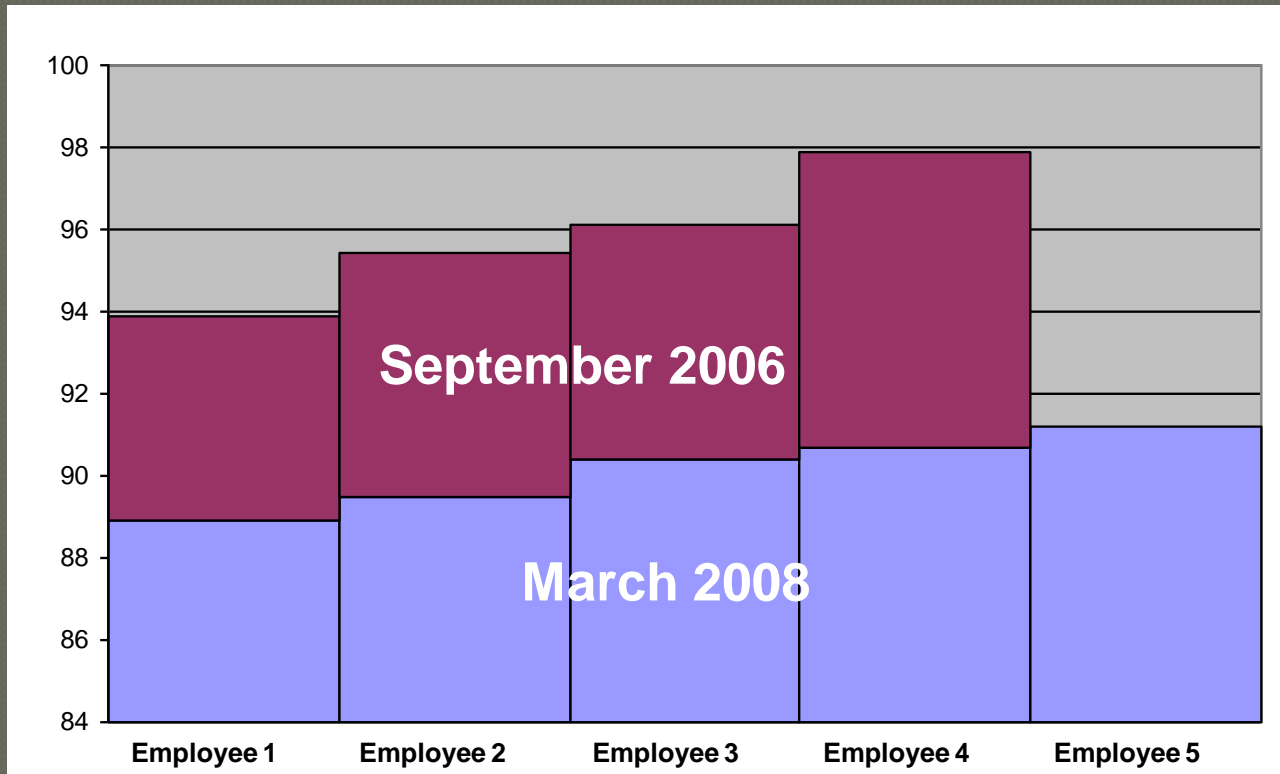


Kent Community Initiative

- Main Issues – Management (Duty Holders)
 - No knowledge of laws to protect employees' hearing
 - No knowledge of how loud their businesses were
 - No knowledge of how to remedy the situation
- Intervention Philosophy – Local Authority
 - Informal, educative, raise awareness, collaborative
 - Sensitive to business & client needs, progressive
 - Heavy-handed approach likely counter-productive
- Outcomes
 - Positive response, no resistance from establishments
 - Duty holders genuinely interested in findings from visits
 - Making efforts to reduce employee noise exposure
 - Concern extending to clientele, creating quiet areas

Kent Community Initiative

- Example of change at one Canterbury nightclub
 - Five employees, change from Sep 2006 to Mar 2008



San Diego Community Initiative



Image: Public domain.

Okay, So Now What?

**As Hearing Health
Professionals, What
Can We Do to Help the
Live Entertainment
Industry Protect Their
Workers' Hearing?**

Increase Awareness?

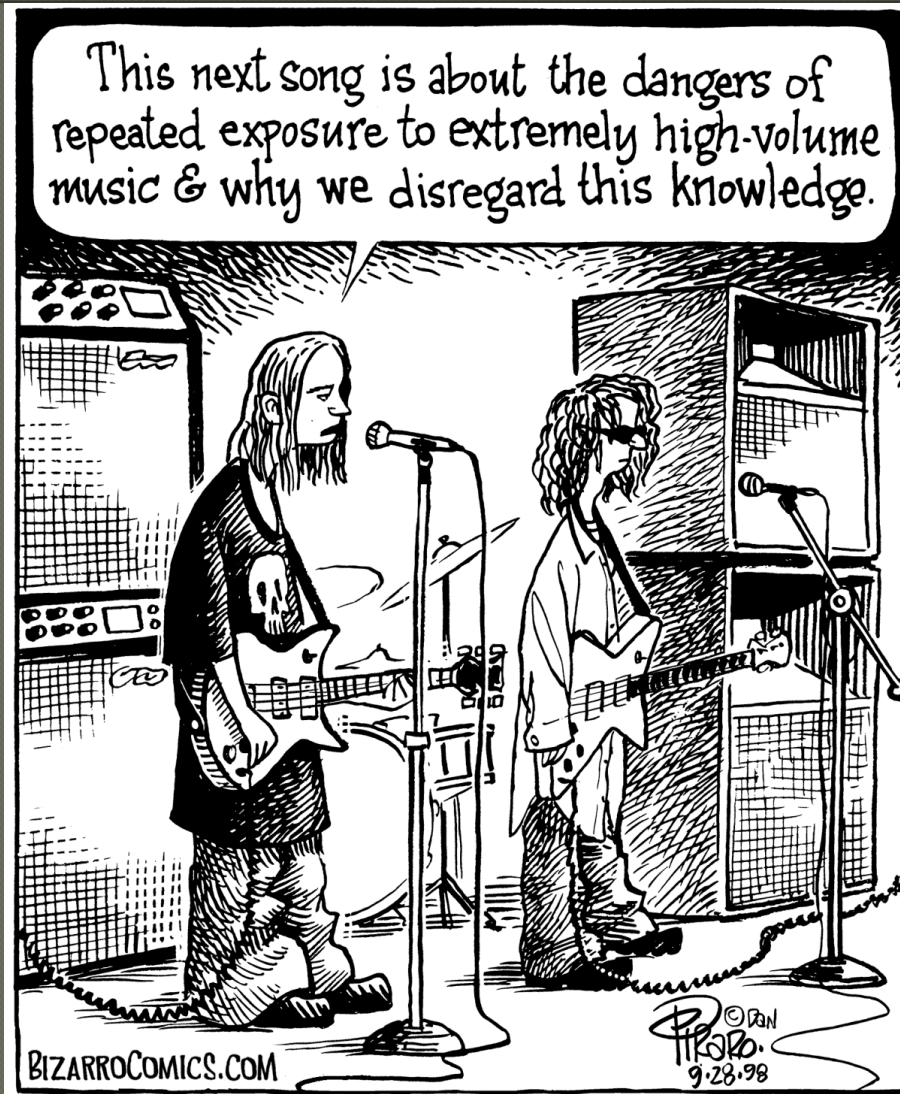


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Instigate a Culture Change

- Increasing awareness isn't enough, but it's a start
 - Hearing loss prevention is now a part of major music and audio education programs
- Increase demand and use of products designed to protect hearing while enhancing job performance
- Make hearing loss prevention part of the daily work culture
 - Get management buy-in; make appropriate HPDs available
- Collaboration among stakeholder groups
- Self-regulate
 - Work toward industry-specific safety standards
 - Align insofar as possible with OSHA requirements

Daily Work Culture

● Management

- Demonstrate care and concern for worker well-being
- Research hearing conservation; know the law
- Include appropriate HPDs when kitting a gig/tour
- Make quiet rest areas and HPDs available at venues

● Employees

- Remind management that your hearing is critical to your career
- Research hearing conservation; know your rights
- Wear HPDs appropriate to your job, take *quiet* breaks

Gravitas – Now That's Heavy

- In live entertainment, hearing is one of the most important and most used tools at the gig. Unlike other equipment, there are no new models coming, no replacement parts, and no warranty.
- Hearing aids don't restore hearing that's been lost. They only make use of the hearing that's left. And earplugs now are a lot less expensive than hearing aids later.
- Nutraceutical and pharmaceutical prophylactic and rescue agents are also likely to work best when they have something to work with. Combine their use with appropriate hearing protection.

Develop Self-Regulation

- Establish some ground rules
 - Basic procedures
 - Hierarchy of responsibility
 - Training of talent, crews, and venue staff
- As managing hearing loss prevention becomes integrated into the industry's culture, work the requirements into contracts
 - Specify quiet break areas
 - Provision of HPDs
 - Specify sound levels: peak, short-term average, and L_{eq}

Best Practices - Tools

Limit stage volume

- Educate the talent
- Let the PA system do the work
- Use in-ear monitors

Loudspeaker line arrays

- Steer the array for even coverage

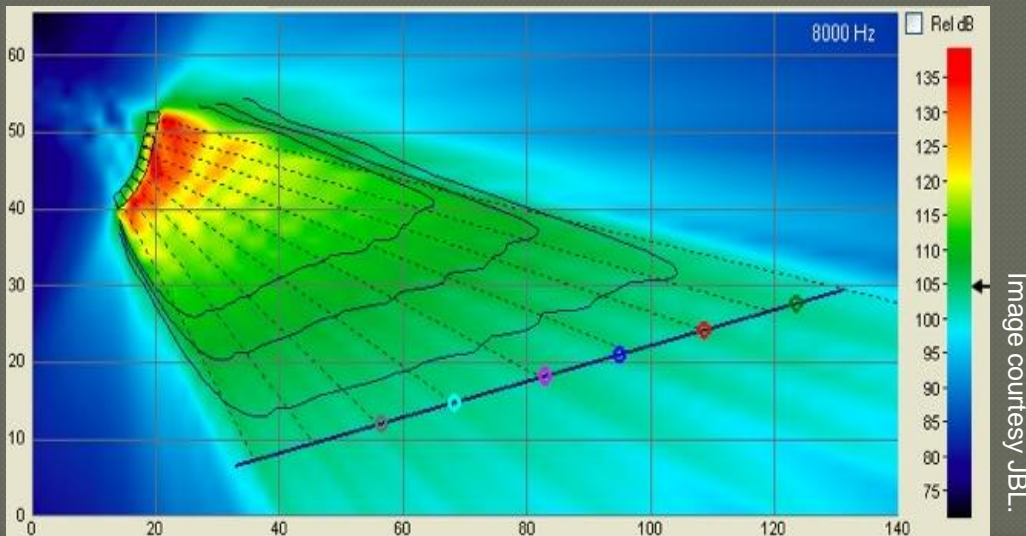


Image courtesy Sensaphonics.



Image courtesy Shure Incorporated.

Best Practices – Tools

- Engineering controls

- Gobos and isolation panels



Image courtesy Drum Shield.org

- Administrative controls

- Work area reassignment
 - Quiet areas away from noise, including the audience

- Hearing protection

- Appropriate for work setting
 - Uniform attenuation for music
 - Monitor & encourage use
 - Especially during festival shows



Image courtesy Honeywell Safety Products

Best Practices - Assessment

● Measure sound levels

- On stage, back stage, quiet areas, audience
- Dosimetry: On-shoulder and in-ear
 - Especially important during festival shows



Image courtesy Casella CEL Inc.



Image courtesy Honeywell Safety Products

● Fit testing of earplugs

- Use on-site
- HPD selection & training
 - Custom & non-custom earplugs

● Audiometric evaluations

- High-frequency & OAE testing for audio pros & musicians
- Negotiate inclusion in employee health benefits

Best Practices - Procedures

● Formalize the program

- Policies & Practices – Write it down, codified but flexible
- Routines – HPDs in the gig bag, HPDs available at venue, dosimeters and/or SLMs at the venue
- Education – Every trade has safety courses, every profession has CE
 - Use a peer-to-peer teaching model
 - Try surgical model: See one, Do one, Teach one
- Review OSHA Hearing Conservation Amendment
 - Must have an effective HC Program

● Make hearing loss prevention a habit

● Make it a part of the industry's work culture

Gaining Traction In the U.S.

- OSHA has Live Entertainment under microscope
 - Deadly safety issues in recent past
 - Industry has renewed focus on safety
- The Event Safety Alliance
 - <http://www.eventsafetyalliance.org>
 - The *Event Safety Guide* is now available
- Professional Lighting and Sound Association
 - <http://www.safetyinentertainment.org>
 - Technical certification, vocational training, ANSI standards
 - *Does not yet address hearing loss prevention*
- Both orgs asking for experts to join and assist
- Audio Engineering Society
 - Conference on Music-Induced Hearing Loss
- Audiology is now a recognized audio technology career path

Facilitate Education & Cooperation

● The Live Entertainment industry:

- Needs experts in hearing and hearing conservation, professional audio, music production, and performance
- Few Triple Threats, but we can help groom the future
- Must recognize the authority of regulatory bodies responsible for worker health and safety

● Regulatory bodies:

- Need experts who know the management and business structure of the Live Entertainment industry, how it differs from bricks-and-mortar industries, and how to accommodate those structures.
- Need to accept that music and sound—sometimes loud—are integral to the experience.
- Must acknowledge and work with professional organizations in Live Entertainment on unique health and safety goals.

Facilitate Stakeholder Collaboration



event
safety
alliance



MUSICARES®





Photos: Public domain

Thanks for tuning in.

Questions?

Robert.Ghent@Honeywell.com