TECHNICALLY ACHIEVABLE, ADMINISTRATIVELY ACHIEVABLE, AND PROMISING NOISE CONTROLS

30 CFR PART 62

PROGRAM INFORMATION BULLETIN NO. P04-18

- Applicable to MSHA enforcement personnel, equipment manufacturers, coal & m/nm mine operators, independent contractors, miners, miners' representatives, and other interested parties.
- Issued August 2, 2004
- Provide guidance on technologically and administrative achievable engineering and administrative noise controls

ISSUE DATE: 08/02/2004

PROGRAM INFORMATION BULLETIN NO. P04-18

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SUBJECT: Technologically Achievable, Administratively Achievable, and Promising Noise Controls (30 CFR Part 62)

his PIB contains a list of controls for the following equipment:

1. Air Arcing
2. Air-Actuated or Air-Operated Cylinders
3. Augers - Surface
4. Auxiliary Ventilation Fans
5. Car Shakers and Rotary Dumps
6. Channel Burners
7. Continuous-Mining Machines / Augers / Loaders (Underground)
8. Diesel - Locomotives
9. Diesel - Underground Diesel-Powered Equipment
10. Draglines, Shovels and Cranes Not Equipped with Operator Cabs
11. Draglines, Shovels and Cranes Equipped with Operator Cabs
12. Dredges and Associated Equipment
13. Drills – Jumbo Drills
14. Drills – Truck Mounted/Blast Hole/Air Track
15. Hand-Held Percussive Tools
16. Longwalls
17. Mantrips
18. Mills / Processing Plants / Coal Preparation Plants (including Breakers at Anthracite Mines)
19. Mobile Equipment - Surface
20. Portable Crushers / Screening Plants and Associated Equipment
21. Roof Bolting Machines
22. Scalers
23. Stone Saws

PROGRAM INFORMATION BULLETIN (PIB)

- PIB is a listing of technologically achievable noise controls and those found to be "promising".
- In general "achievable" means capable of being done.
- As used in the PIB, "Noise Controls" are either engineering or administrative controls.
- The noise controls are listed not as a check list, but should be considered for application to specific conditions at a mine.

NOISE PIB PRESENTATION

- The full presentation is on the CD in your information packet.
- It encompasses both Coal and Metal and Nonmetal mining operations.
- The PIB is in Appendix 5 of Chapter 3 of the “Coal Mine Health Inspections Procedures Handbook.”

FEASIBILITY

- Feasibility is considered on a **case-by-case basis, based on the conditions at the mine.**
- Technical achievability is part of total feasibility. **(Feasibility = Technically Achievable +Economic Achievable)**
- An engineering or administrative control is technically achievable if it can reduce noise exposures to the PEL or a 3 dBA equivalent reduction in exposure used either singly or in combination with other engineering or administrative controls.

TYPES OF CONTROLS

- **Achievable Controls** – Known to have a demonstrated effectiveness either singly or as part of a suite of noise controls.
  - **Conditional Control**
    - Its effectiveness is demonstrated dependent on the conditions that exist at the mine site; and
    - The installation and use of the control may create a collateral health or safety hazard, which must be addressed.

TYPES OF CONTROLS

- **Promising Controls** – May have a demonstrative effectiveness (lack of evaluation and/or documentation in terms of significant reduction of a miner's noise exposure either singly or as part of a suite of noise controls).
- With sufficient validation, a promising control may move up the list to be a technically achievable control.

14. Drills – Truck Mounted / Blast Hole / Air Track

MSHA considers the following engineering noise controls, or a combination of these controls, to be **technologically achievable** in reducing the noise exposure of miners operating drills:

- **Environmental cabs that include appropriate acoustical materials (see Section One Introduction) applied to internal surfaces;**
- **Exhaust mufflers and redirection of the exhaust away from the operator;**
- **Portable enclosures / barriers for the operator; and**
- **Appropriately selected, correctly installed, and properly maintained acoustical materials (see Section One Introduction) to treat the operator's compartment.**

MSHA considers the following engineering noise controls to be conditional:

- **Barrier between the engine /compressor and the operator;**
- **Silencers on air release nozzles; and**
- **Relocation of the air compressor away from the air track drill.**

The following control offers *promise* in reducing miner noise exposures:

- *Wet drilling (i.e., injection of water under pressure into the air stream of the drill hole clearance system) where it can be implemented due to the drill's design and is compatible with the geology and the mining method.*

21. Roof Bolting Machines

MSHA considers the following engineering control and work practices to be **technologically and administratively achievable** in reducing a miner's noise exposure when working on or around a roof bolting machine:

- **Wet drilling (where it can be implemented due to the roof bolter design and when compatible with the geology and mining method);**
- **Sharp drill bits;**
- **Starter drill steel to begin the hole;**
- **Straight drill steel (one piece and with thick wall, if conditions and dust collection allow);**
- **Replacement of worn or defective drilling components (e.g., drill pot bushings or bearings, worn steel, bent steel); and**
- **Maintenance of manufacturer-recommended drilling parameters for thrust, torque, and rotational speed.**

The following engineering controls and work practices offer *promise* in reducing a miner's noise exposure:

- *Automated dust collection system or actuation of the dust collection system motors only during drilling, or use of administrative controls to accomplish the same task;*
- *Exhaust conditioner (water box) and/or manufacturer-recommended exhaust muffler;*
- *Controls for optimizing the drilling parameters (drill feedback system);*
- *Water misting system (i.e., injection of a small volume of water in a mist form into the drill hole clearance system);*
- *Grommet to isolate the drill steel and chuck;*
- *Acoustical liner in the tool tray; and*
- *Damped drill steels.*

GENERAL

- The mining **noise standard** is an occupational exposure based standard; PIB is on a machine/equipment basis.
- “APPROPRIATE ACOUSTICAL MATERIALS”
  - Selected based on a scientific noise control basis, commensurate to the task.
  - Must be **appropriately selected, correctly installed, and properly maintained**.
  - Aware of flammability properties.

CONTINUOUS MINERS

CONTINUOUS MINING MACHINES/AUGERS/LOADERS – (Underground)

- Use of remote controls with proper operator positioning;
- Use of treated cutting heads on auger miners (e.g., the application of stiffening gussets to the helix and filling of voids with sand);
- Use of constrained layer damping on the conveyor pan line of auger miners ;
- Proper maintenance (chain tensioning, etc.)
- Limit time conveyor runs without material; and

CONTINUOUS MINING MACHINES/AUGERS/LOADERS – (Underground)

- Locate the shuttle car change-out point away from major noise sources e.g. auxiliary fan.

Administrative Controls for Continuous Miners

- Avoid idle parking in high noise areas;
- Keep workers away from auxiliary fans;
- Have mechanics and electricians avoid working near high-noise sources during maintenance;
- Reduce utility man working time near face and auxiliary fan;
- Limit operation of chain conveyors when empty on all equipment;

Administrative Controls for Continuous Miners

- Eliminate a high-pitch screech by instructing roof bolters to drill straight holes and to minimize metal strap contact with the drill steel;
- Follow a cutting cycle that minimizes noise generation from both the continuous mining machine and the cutting process (i.e., reduce cutting into roof and floor rock, cutting directly into in-seam rock, and over sumping);

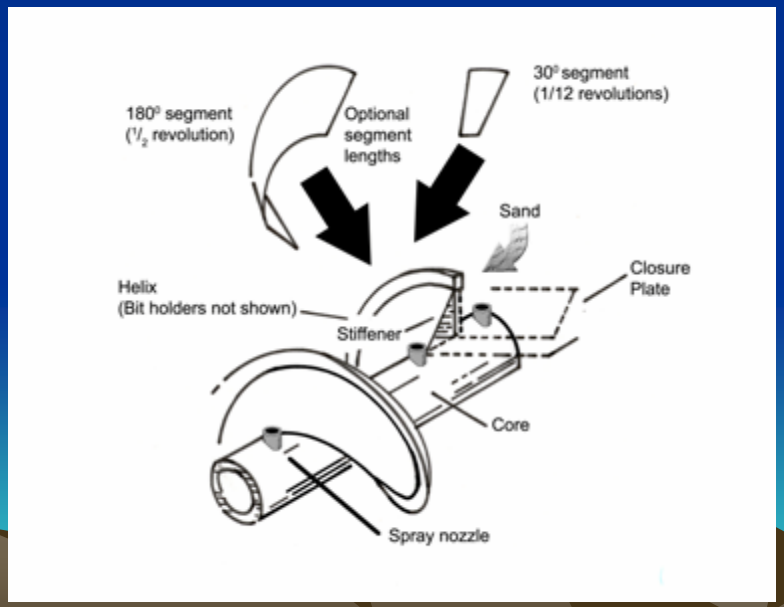
Administrative Controls for Continuous Miners

- Regulate engine RPMs on diesel-powered shuttle cars during loading and dumping;
- Follow shuttle car loading and tramming procedures that minimize noise (e.g. time that the conveyor chain is running, increase distance from CM and the boom, etc.);

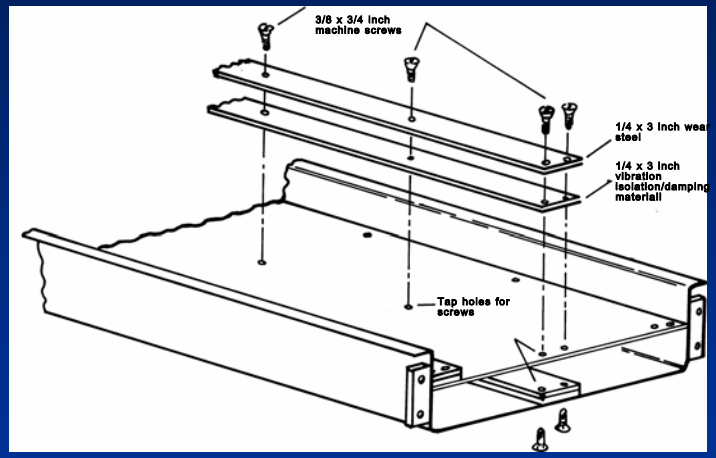
Administrative Controls for Continuous Miners

- Follow loading and tramming procedures for loading machines that minimize noise ; and
- Turn off any mobile equipment when not in operation .

AUGER CUTTING HEADS



CONSTRAINED LAYER DAMPING TECHNIQUES



CONTINUOUS MINING MACHINE (Promising)

- Use of a clear barrier between the operator and pan conveyor pan line;
- Use of constrained layer damping on the conveyor pan line for ripper miners;
- Use of sand-filled conveyor decks;
- Insulate/enclose motors and pump housings;
- Use vibration isolation mounts on motors and pumps;
- Use coated flights on chain conveyors;

CONTINUOUS MINING MACHINE (Promising)

- Rotate center bolter operator with center bolter helper, roof bolter operator with utility men or shuttle car operators, miner bolter operator with loading machine operator, or continuous miner operator with shuttle car operator;

CONTINUOUS MINING MACHINE (Promising)

- Use of isolated cutting bits; and
- Use of sand-filled cutting heads.

CONTINUOUS MINER SCRUBBER

- Maintaining proper fan blade clearance .

CONTINUOUS MINER SCRUBBER (Promising)

- Use a silenced fan housing;
- Use of sleeve-style attenuator;
- Use of alternate face air flow distribution system (fan spray system);
- Use of bolt-on attenuators; and
- Appropriately selected, correctly installed, and properly maintained acoustical materials applied to the dust scrubber.

UNDERGROUND DIESEL POWERED EQUIPMENT

DIESEL - UNDERGROUND DIESEL-POWERED EQUIPMENT

- OEM Environmental cabs that include appropriate acoustical materials;
- Use of an exhaust muffler;
- Non-OEM cabs (conditional); and
- Use of appropriate acoustical material to reduce noise from the engine and transmission compartments (conditional).

CABS

CABS

BARRIERS AND ABSORPTION MATERIALS

MUFFLERS

DIESEL - UNDERGROUND DIESEL-POWERED EQUIPMENT

- Redirection of the exhaust away from the operator; and
- Remote Controls.

MILLS/PROCESSING PLANTS/COAL PREP. PLANTS

MILLS/PROCESSING PLANTS/COAL PREP. PLANTS

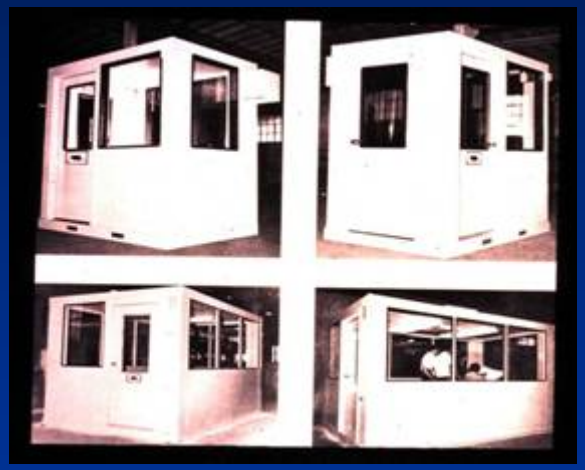
- Acoustically treated control booths;
- Use of full enclosures without a top around equipment or miner work locations;
- Use of partial enclosures without a top around equipment or miner work locations (conditional);
- Acoustic baffles suspended above enclosures (conditional) ;
- Use of resiliently backed mill liners (conditional);
- Use of chute liners (conditional);

MILLS/PROCESSING PLANTS/COAL PREP. PLANTS

- Use of covered chute enclosures (conditional) ;
- Use of dead boxes and impact pads (conditional) ;
- Use of resilient screen decking (conditional) ;
- Use of electro-mechanical sensing devices to limit exposure times;
- Use of video technology to limit exposure times; and
- Use of bin-level indicators.

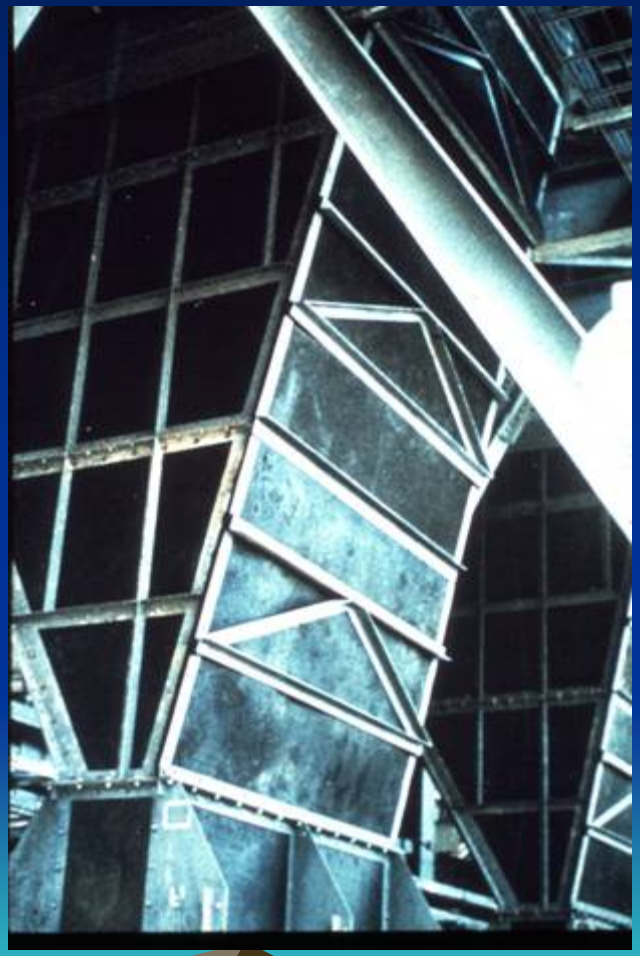
ENCLOSURES AND BOOTHS

CONTROL ROOMS

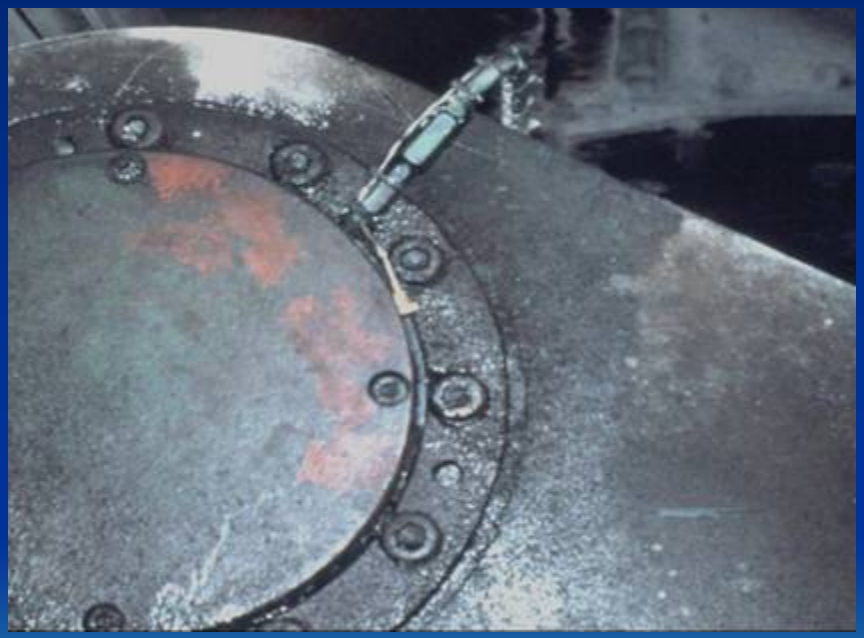


BAFFLES ABOVE ENCLOSURES

CHUTES & DECKING



REMOTE SENSING



MILLS/PROCESSING PLANTS/COAL PREP. PLANTS (Promising)

- Replacement of spring mounts with vibration isolation mounts made of rubber, ROSTA mounts, and air bags;
- Use of “double isolation” mounting methods;
- Replacement of large size screens with banana screens. Applicable where there is no height restrictions.

VIBRATION ISOLATION

PLANTS/MILLS ADMINISTRATIVE CONTROLS

- Rotate plant operator with control room operator; inside mechanic with outside mechanics; high-noise floor workers with low-noise floor workers; and in-plant workers with outside-plant workers;
- Limit plant worker time on noisy floors, working in or next to noisy equipment such as screens, crushers, centrifuges, and dryers;

PLANTS/MILLS ADMINISTRATIVE CONTROLS

- Relocate work stations/controls to quieter locations;
- Relocate tool boxes, cabinets, and supplies to quiet areas;
- Operate noisy equipment/process (welding, grinding, etc) when fewer workers will be exposed; and

PLANTS/MILLS ADMINISTRATIVE CONTROLS

- Perform maintenance during downtimes, if possible.

PLANTS/MILLS ADMINISTRATIVE CONTROLS (Promising)

- Move pulp density measuring to quiet location;

MOBILE EQUIPMENT - SURFACE

MOBILE EQUIPMENT - SURFACE

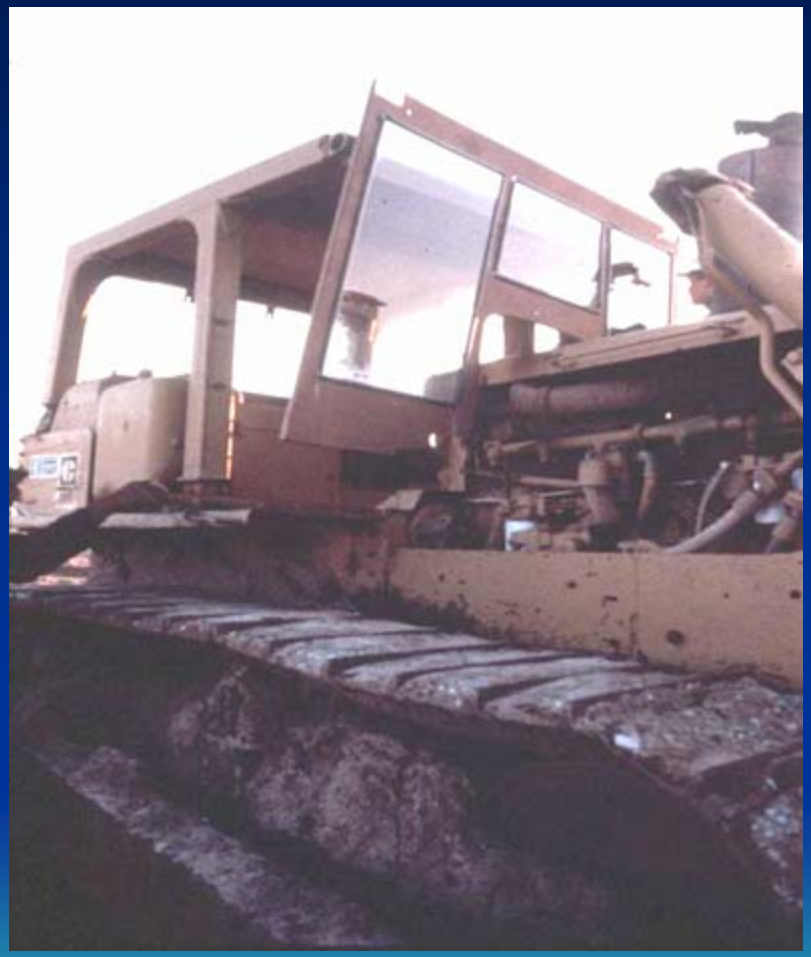
- Environmental cabs (equipment since mid-1970s) that include appropriate acoustical materials;
- Use of exhaust mufflers;
- Redirection of exhaust away from the operator
- Installation of a full or partial skin kit to the ROPS/FOPS (conditional); and
- Use of appropriate acoustical materials to treat the operator's compartment (conditional).

ENVIRONMENTAL CABS

REDIRECTION OF MUFFLER

ENVIRONMENTAL CAB TREATMENTS

PARTIAL BARRIER



MOBILE EQUIPMENT - SURFACE (Promising)

- Use of remote controls.

REMOTE CONTROL

Roof Bolter

ROOF BOLTING MACHINE

- Maintain OEM recommended drilling parameters for thrust, torque, and rotational speed
- Use of wet drilling techniques, when and where feasible (machine design, geology, mining method)

ROOF BOLTING MACHINE

- Use of sharp drill bits;
- Use of a starter drill steel to begin hole;
- Use of straight drill steel;
- Proper drill maintenance – replace worn or defective parts;

Roof Bolter

ROOF BOLTING MACHINE (Promising)

- Use of automated dust collection system or actuation of the dust collection system motors only during drilling, or use of administrative controls to accomplish the same task;
- Use of an exhaust conditioner (water box);
- Use of controls to optimize drilling parameters;

ROOF BOLTING MACHINE (Promising)

- Use of a water misting system;
- Use of a grommet to isolate the drill steel and chuck;
- Installation of an acoustical liner in the tool tray; and
- Use of damped drill steels.

A PRACTICAL APPROACH TO REDUCING MINERS' NOISE EXPOSURE

A PRACTICAL APPROACH TO REDUCING MINERS' NOISE EXPOSURE

- Section 2 of the PIB
- Three Areas
  - Maintenance (9)
  - Work Practices (17)
  - Engineering/Administrative Controls (19)
- 45 Questions to consider when addressing a noise control problem.

A PRACTICAL APPROACH TO REDUCING MINERS' NOISE EXPOSURE -Maintenance

- Are all existing noise controls maintained?
- Are mechanical components/systems adequately maintained including maintaining and greasing rollers, bearings, etc.?
- Are bolts tight, covers and compartments secure to prevent noise exposures?
- Do smooth transitions exist between rail tracks?

A PRACTICAL APPROACH TO REDUCING MINERS' NOISE EXPOSURE – Work Practices

- Are sharp cutting tools used?
- Do dust collection systems operate only when needed?
- Are proper thrust, rotational speed, torque and chain tensioning being used?
- Are good work practices being employed?
- Are there work practices that result in unnecessary exposure?
- Are conveyors operated either wet or with material?

A PRACTICAL APPROACH TO REDUCING MINERS' NOISE EXPOSURE – Engr./Admin. Controls

- Are all feasible engineering and administrative controls installed and maintained?
- Are environmental cabs used on surface mobile equipment?
- Can a TV camera/monitor be used to observe critical operations thus limiting a miner's exposure?

SOME EXAMPLES OF ADMINISTRATIVE CONTROLS

MSHA POLICY

- Labor/management agreements will not be affected by the noise standard.
- MSHA will not require an operator to hire additional miners in order to “exhaust” all feasible administrative controls.

SOME EXAMPLES OF ADMINISTRATIVE CONTROLS

- Adjusting Work Schedules (3)
- Utilize Work Practices to Lower Noise Exposures (10)
- Using Real-Time Noise Dosimetry/ Instrumentation to trigger administrative controls
- Use Remote Sensing Technology
- Designated low-noise areas
- Identify and follow maintenance procedures to reduce noise generation and reduce exposures. (4)

Feasibility of Noise Controls – Considerations and Resources

Noise Controls

- The MSHA noise rule discusses two types of noise controls: administrative controls and engineering controls.
- They can be used either individually or in combination.

Feasibility of Noise Controls Based On The Federal Mine Safety And Health Review Commission (FMSHRC)

- Reduces exposure
- Is economically achievable
- Is technically achievable

Secretary of Labor v. A.H. Smith, 6 FMSHRC 199(1984); Secretary of Labor v. Callanan Industries, Inc. 5 FMSHRC 1900 (1983)

Preamble to Noise Standard: FR v64, No. 176/Monday, 9/13/99 PP 49576

Feasibility of Noise Controls (FMSHRC)

- Technically Achievable – It can yield a significant noise reduction.
- Economically Achievable – It is economically rational to require the control in order to achieve the reduction.
- Feasible-The control is both Technically and Economically Achievable.

Feasibility

- Feasibility = **Technically Achievable** (Engineering and/or Administrative Control) + **Economically Achievable**

Feasibility of Noise Controls (FMSHRC)

…to sustain a citation, the Secretary must provide:

1. Sufficient **credible evidence of** a miner's **exposure** to noise levels in excess of the limits specified in the standard.
2. Sufficient **credible evidence of** a technologically achievable engineering **control that could be applied** to the noise source.

Secretary of Labor v. Callanan Industries, Inc. 5 FMSHRC 1900 (1983)

Feasibility of Noise Controls (FMSHRC)

…the Secretary must provide:

3. Sufficient **credible evidence of the reduction** in the noise level that would be obtained **through implementation** of the engineering control
4. Sufficient **credible evidence** supporting a **reasoned estimate of** the expected economic **costs** of the implementation of the control

Secretary of Labor v. Callanan Industries, Inc. 5 FMSHRC 1900 (1983)

Feasibility of Noise Controls (FMSHRC)

…the Secretary must provide:

5. A **reasoned demonstration** that, in view of the previous elements, the **costs** of the control **are not wholly out of proportion to the expected benefits.**

Secretary of Labor v. Callanan Industries, Inc. 5 FMSHRC 1900 (1983)

Definition Of "Wholly Out Of Proportion" As Taken From Program Policy Letter No. P04-IV-1 & P04-V-1

- Item #2(c), Under "Feasibility of Engineering and Administrative Controls"
  - Whether the committed resources are wholly out of proportion to the expected results
    - "If a control is extremely costly for the operator but the expected reduction in noise exposure is minimal, MSHA may determine that it is not economically feasible for you to install the control"

Control Feasibility

1. **Achieves Compliance OR**
2. **Feasible even though it fails to reduce exposure to permissible levels contained in the standard, as long as there is a significant reduction in a miner's exposure.**

Todilto Exploration v. Secretary of Labor, 5 FMSHRC 1894, 1897 (1983)

Preamble to Noise Standard: FR v64, No. 176/Monday, 9/13/99 PP 49576

MSHA Policy

- MSHA has determined that a 3-dBA reduction in a miner's exposure is the relevant factor in determining feasibility.

Note: A reduction in exposure can be used to evaluate both engineering and administrative controls whereas administrative controls cannot be evaluated in terms of sound pressure level reductions.

Preamble to Noise Standard: FR v64, No. 176/Monday, 9/13/99 PP 49576

What Can Be Done ?

It depends on the situation (Case by case basis)

- Majority of situations will be simple “common sense” solutions (Mufflers, close doors, close windows, install covers, seal cracks, acoustic materials, limit time, etc)
- Others will be more complex. (Multi-noise sources, covers a large area, mobile occupation)

What Can Be Done ?

- Is the noise exposure located at an underground mine, surface mine or processing operation?
  - Location may limit options and possibilities
    - Visibility, flammability, space and safety
- What is the Noise Dose or SPL ?
  - What is the amount needed for compliance or a significant reduction?
    - Minimal reduction generally costs less

ECONOMIC ASPECTS

Economic Achievability Examples

- A.H. Smith Stone Company (1984)
- Duininck Brothers, Inc. (1991)
- Explosives Technologies International (1992)

A.H. Smith Stone Company, 6 FMSHRC 199 (1984) - involving a diesel-powered shovel - the Commission affirmed the ALJ's finding that MSHA had:

- determined a miner's noise exposure exceeded the PEL
- shown one or more controls to be technologically feasible
- shown the estimated compliance cost range of $600 to $1400 was not "...wholly out of proportion to the expected benefits."

Duininck Brothers, Inc., 13 FMSHRC 1436 (1991) - involving a tractor and a bulldozer – An ALJ found that the:

- Secretary demonstrated that miners were overexposed to noise
- Secretary demonstrated that a full cab with acoustical treatment was a technologically feasible control
- $10k-$13k cab cost for each machine was not "wholly out of proportion to the expected benefits." *(Cost of reduction/ value of machine ratio is not a consideration)*

Explosives Technologies International 14 FMSHRC 59 (1992) - involving an Atlas hydraulic drill – the Commission found that :

- The Secretary established a prima facie case outlined in the Callanan Industries decision.
- The Secretary demonstrated that the drill operator was overexposed to noise
- The Secretary demonstrated that a partial barrier or full cab with acoustical treatment was a technologically feasible control
- A partial barrier costing $1,000 or a full cab costing $50k-$70k on the drill was a economically achievable control.

Noise Enforcement Policy Relevant Elements

- "...neither MSHA nor the Commission has placed a value on the cost of a control per decibel of reduction or the number of miners affected, [but] ...MSHA will not require an irrational expenditure to achieve a minimal noise reduction." [Feas. 3C]
- "...MSHA will determine whether the cost of abatement is out of proportion to the expected reduction in noise exposure." [2C]
- "...MSHA will not require rod and ball mills to be enclosed at costs that could reach hundreds of thousands of dollars." [2C]

Noise Enforcement Policy Relevant Elements

- "…[MSHA] may require that control rooms and other practical controls be implemented to reduce noise exposure." [2C]
- "…MSHA will not require [an operator] to hire additional workers in order to "exhaust" all feasible administrative controls." [4]

MSHA may enter into Compliance Action Plans Establishing Abatement Action Timetables

- Stillwater Mining re noise overexposures
- Malvern Minerals re silica overexposures

RESOURCES

Inspector Resources

1. Personal Experience
2. Fellow Inspectors
3. **PIB (P04-18)**
4. **PIL (P04-IV-1 & P04-V-1)**
5. **Noise Control Resource Guide**
6. **MSHA Technical Support Reports**
7. Company Mechanics
8. Equipment Manufacturers
9. Noise Technical Database

Items In Yellow Are Available From MSHA Homepage

ISSUE DATE: 08/02/2004

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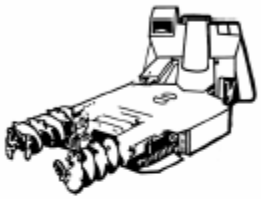
- **Wet drilling (where it can be implemented due to the roof bolter design and when compatible with the geology and mining method);**
- **Sharp drill bits;**
- **Starter drill steel to begin the hole;**
- **Straight drill steel (one piece and with thick wall, if conditions and dust collection allow);**
- **Replacement of worn or defective drilling components (e.g., drill pot bushings or bearings, worn steel, bent steel); and**
- **Maintenance of manufacturer-recommended drilling parameters for thrust, torque, and rotational speed.**

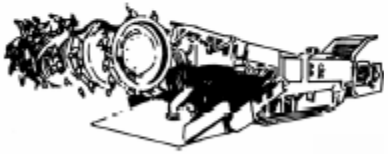
The following engineering controls and work practices offer *promise* in reducing a miner's noise exposure:

- *Automated dust collection system or actuation of the dust collection system motors only during drilling, or use of administrative controls to accomplish the same task;*
- *Exhaust conditioner (water box) and/or manufacturer-recommended exhaust muffler;*
- *Controls for optimizing the drilling parameters (drill feedback system);*
- *Water misting system (i.e., injection of a small volume of water in a mist form into the drill hole clearance system);*
- *Grommet to isolate the drill steel and chuck;*
- *Acoustical liner in the tool tray; and*
- *Damped drill steels.*

Noise Control Resource Guide – Underground Mining

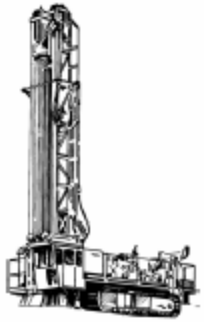
U. S. Department of Labor
Mine Safety and Health Administration





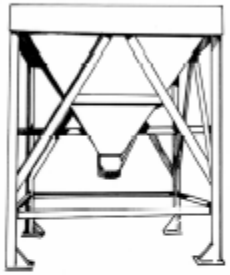
Noise Control Resource Guide – Surface Mining

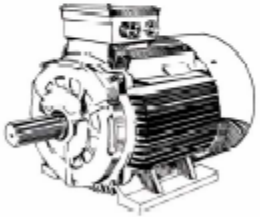
U. S. Department of Labor
Mine Safety and Health Administration



Noise Control Resource Guide – Mills and Preparation Plants

U. S. Department of Labor
Mine Safety and Health Administration





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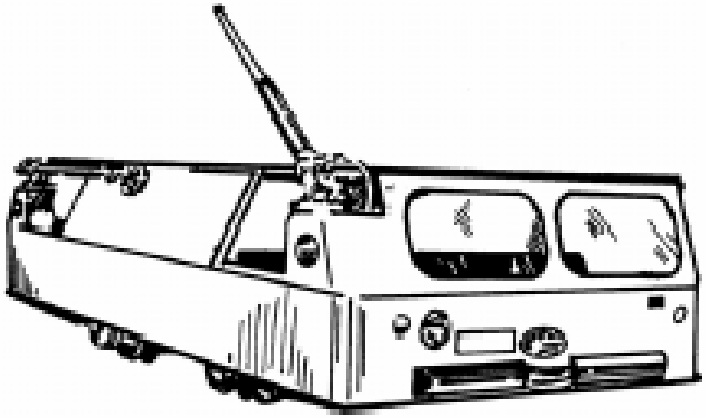

Rail mounted mantrips are used to transport workers in mines. They are either diesel powered or electrically powered from trolley wires. Mantrips can be utilized in both metal and non-metal mines as well as coal mines.

1. Original Equipment Manufacturers (OEM)

The following table illustrates OEMs offering noise controls for new personnel/mantrip rail-mounted carriers. Local dealers should be contacted for availability and further details. For personnel/mantrip vehicles without noise controls, retrofit noise controls are needed.

Noise Control Availability from OEMs				
Manufacturer	**Enclosed Treated Cab (Optional Cost)**	**Partial Enclosed Cab (Optional Cost)**	**Treated Engine Housing**	**Acoustically Redesigned Open-Cab**
J. H. Fletcher	None	None	X	None
Goodman Equipment	None	($2,000-$5,000)	None	None
Lee A&L Co.	($5,000-$8,000)*	X	X	None
Hagar Equipment Co. of Alabama, Inc.	None	None	None	($97,000)

*Large model diesel
"X" indicates product availability.

B. Retrofit Noise Controls

The following OEMs offer retrofit noise controls for personnel/mantrip carriers. Local dealers should be contacted for availability and further details.

Retrofit Noise Controls Availability	
Manufacturer	**Treated Cab (Cost)**
Goodman Equipment	X ($2,000-$5,000)
Lee A&L Company	X ($5,000-$8,000*)

*Large models. "X" indicates product availability.

Additional noise controls include the installation of absorption material to the inner surfaces of existing cabs or passenger compartments.

Absorption Material Used to Insulate Inner Surfaces of Cabs or Passenger Compartment

Vibration isolation and/or damping material or components may be installed on certain components such as motors and sheet metal panels. Some standard components may be replaced with noise controlled components.

C. Alternative Technology

There is no alternate technology.

FRONT-END LOADERS

A front-end loader is a wheel or crawler mounted tractor with a front mounted bucket. It is utilized in excavating, loading, and transporting material. Because of its versatility, it is found in a wide variety of mining applications. Its articulated frame gives the machine excellent maneuverability. Standard equipment is noted; optional equipment shows cost.

1. Original Equipment Manufacturers (OEM)

The following table illustrates OEMs offering noise controls for new front-end loaders. Local dealers should be contacted for further details.

Noise Control Availability from OEMs			
Manufacturer	**Fully-Treated Cab**	**Optional Cab (Cost)**	**Muffler**
Caterpillar	X	None	X
Coyote	X	None	X
Kawasaki	X	None	X
Komatsu/Dresser	X	None	X
Marathon/LeTourneau	X	None	X
Hitachi	X	None	X
Fiat-Allis	X	None	X
O&K Trojan	X	None	X
Terex	X	None	X
Unit Rig (Dart)	X	None	X
VME America	X	None	X
Case	None	X ($8,000-$10,000)	X
Kobelco	None	X ($9,000-$12,000)	X
Mitsui	X*	X* ($8,000)	X
Waldon	None	X** ($4,000-$5,000)	X
Melroe (Bobcat)	None	X ($1,400-$1,600)	X

"X" indicates product availability
**Larger models
*Smaller models

For front-end loaders without sound suppressed cabs, retrofit noise controls are needed. For details regarding retrofit noise controls, refer to Section 2.

2. Retrofit Noise Controls

The following table illustrates OEMs offering retrofit noise controls for front-end loaders. Local dealers should be contacted for further details.

Retrofit Noise Control Availability from OEMs	
Manufacturer	**Treated Cab (Cost)**
Case	X
Kobelco	X
Mitsui	X
Waldon	X
Melroe (Bobcat)	X

"X" indicates product availability.

Additional retrofit noise controls are aftermarket add-on cab kits.

Appendix C lists dealers of aftermarket cab kits.

Existing cabs should be lined with acoustical material to absorb and/or block-out sound. Material costs may vary with material manufacturers but approximate costs, when purchased in bulk quantities, are as follow:

Absorption	$3.50 per square foot
Transmission Loss	$4.50 per square foot
Composite	$7.50 per square foot

Appendix B lists sources for purchasing acoustical materials.

Equipment Manufacturers

Pre-Assembled Rooms

- Home
- Company History
- Panl-Wall Enclosures
- **Pre-Assembled Rooms**
- Flexible Enclosures
- Absorptive Treatments
- Absorbers & Barriers
- HVAC Silencers
- Project Management
- For OEMs
- For Architects
- News, Tips, FAQs
- Full Service Noise Control
- Literature
- Order Online

INC® Pre-Assembled Acoustical Structures® instantly create durable, portable, self-contained, productive work spaces.

- Quiet rooms
- Personnel shelters
- Control pulpits
- Test booths
- In-plant offices
- Guard & dispatch booths

Control room for a paper mill.

Available in many standard sizes & shapes, these structures are the ideal solution for projects facing limited time, space or funding. Reap benefits such as noise reductions as great as 40 decibels, improved air quality, better security and the ability to control temperature, lighting & humidity levels, all without the inconvenience of on-site construction. And, because they are designed to be portable by fork-lift or crane, INC® Pre-Assembled Acoustical Structures® adapt quickly and easily to changes in facility routines. Custom designed sizes, shapes and configurations, exterior use, etc. are no problem for INC®.

Equipment room for pulp mill.

To learn more about the INC® Panl-Wall®, click here.

Investigate other enclosure options at Flexible Enclosures.

Internet

Equipment Manufacturers

GETMAN

Underground Diesel
Performance Guys

Home | Products for Coal | Products for Hard Rock | Service | Parts | News | Sales | Contact Us | About Us

Exhaust Chiller Enables Use of Paper DPM Filter Elements

Recently introduced Chiller cools exhaust gasses before they enter a paper filter which is 85% effective in removal of DPM (diesel particulate matter) to levels well below those mandated by MSHA.

Enclosed Cabs Meet MSHA Standards and Please Operators

Fully enclosed cabs are available for all Getman products. They have rubber isolation and environmental temperature controls for maximum operator comfort and safety.

Home | Products for Coal | Products for Rock/Stone | Service | Parts | News | Sales | Contact Us | About Us

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PTAD Field Investigations

FY	Total	Coal	MNM
05*	10	2	8
04	21	10	11
03	20	2	18
02	**54**	14	40
01	45	0	45

* As of March 2005

Bulldozer - Noise Sources

Bulldozer - Noise Controls

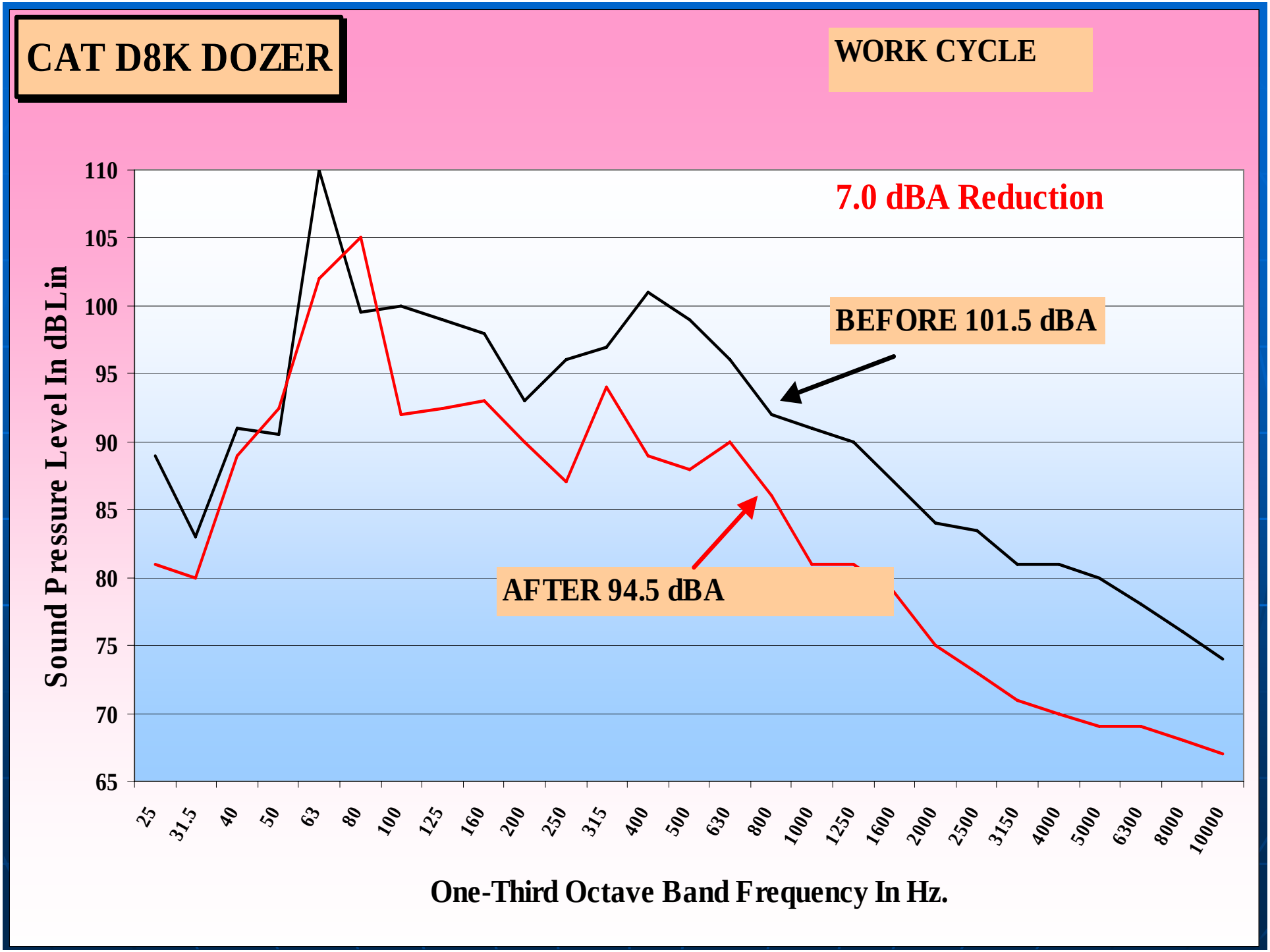
Acoustical Materials

Front Panel

Front Skin Welded to ROPS

Gaps Around Cowl Sealed

Metal Surfaces Covered with Acoustical Material


CAT D8K DOZER
WORK CYCLE
7.0 dBA Reduction
BEFORE 101.5 dBA
AFTER 94.5 dBA
Sound Pressure Level In dBLin
110
105
100
95
90
85
80
75
70
65
25
31.5
40
50
63
80
100
125
160
200
250
315
400
500
630
800
1000
1250
1600
2000
2500
3150
4000
5000
6300
8000
10000
One-Third Octave Band Frequency In Hz.

Costs

Front Skin Kit	$1210
Fiberglass Material	880
Fiberglass Composite	160
Miscellaneous	100
TOTAL	$2355

Retrofit Noise Controls For Drills

Company Homemade Cab

Tamrock
CHA-800
Drill
CHA

Tamrock CHA-800 Drill

At Operator Controls (Untreated)	110.5 dBA
Inside Treated Cab	88.8 dBA
Measured Reduction	21.7 dBA

Cost of Materials (1994) $2,500

Acoustic Material Manufacturer - Price List

Product	Description	Width	UnboundRoll Price/Sqft	Bound Roll Price/Sqft
Quilted Fiberglass Absorbers				
FF-QA-IVX	1 Layer Faced one side	48”	2.28	2.71
FF-QA-1VX	2 Layer Faced one side	48”	4.81	5.25
FF-QA-2VV	2 Layers Faced both sides	48”	5.43	5.86
Composite Quilted Fiberglass Absorbers				
FF-BS-IVIV	2 Layers Barrier Septum Faced, Both Sides	48”	8.40	9.01
FF-BB-IV	1 Layer Barrier Back, Faced One Side	54”	7.88	8.49
FF-BB-2V	2 Layers Barrier Back, Faced One Side	54”	9.54	10.24

Aftermarket Cab Manufacturers

Custom Products of Litchfield, Inc.
(Custom Made Cabs)
Box 718
Litchfield, Minnesota 53555
612-693-3221
800-222-5463

Sims Manufacturing, Inc
(O.E.M. for Cat, J. Deere, Case, etc.)
Payne, Ohio
419-263-2321

Industrial Cab
1850 West Oliver Avenue
Indianapolis, Indiana 46221
317-638-8145

Saf-T-Cab, Inc.
(Large Line of Aftermarket Cabs)
Fresno, California
209-286-5541

Lake Superior Cabs, Inc.
(Reconditioned Cabs, ROPS, Skin Kits)
118 West Harney Road
Esko, Minnesota 55733
800-328-1823

Cabs, ROPS & Attachments, Inc.
P.O. Box 158
Iron River, Wisconsin 54847
800-743-3993

Air Conditioning Manufacturers For Mobile Surface Equipment

Red Dot Air Conditioning Inc.
495 Andover Park East
P.O. Box 58270
Seattle, Washington 98188
206-575-3840

Lintern Corporation
(Corrosion Resistant)
P.O. Box 90
Mentor, Ohio 44061
216-255-9333
800-321-3638

The Birdwell Company Corporation
7308 Greenhouse Road
Dept. IR
Houston, Texas 77084
713-492-1786
800-237-2095

Kysor Industrial

602 East Blackhawk Drive
Byron, Illinois 61010
815-234-2811

Proposed Database

Engineering Noise Control Documentation For Bulldozers

Documentation Number	Manuf.	Model	Date	Dosimeter Results				Sound Pressure Level Results (dBA)		
				Run Time min.	Before Control Dose (%)	After Control Dose (%)	Difference Dose (%)	Before Control SPL_A	After Control SPL_A	Difference SPL_A
1	Caterpillar	D8K	8/12/2001	570	220	115	105	94.4	89.8	4.6
2	Caterpillar	D9H	10/14/2001	660	285	102	183	95.4	88.0	7.4
3	Terex	8350	7/7/2003	540	140	56	84	91.6	85.0	6.6
4	Allis-Chalmers	HD-41	6/19/2003	630	225	89	136	93.9	87.2	6.7
Average				**600.0**	**217.5**	**90.5**	**127.0**	**93.8**	**87.5**	**6.3**
Standard Deviation				54.8	59.5	25.3	43.0	1.6	2.0	1.2

Engineering Noise Controls Documentation

Type(s) Of Noise Controls(Brief)	Cost of Noise Controls Materials	Cost of Noise Controls Labor	PTAD-MSHA Report Number	Location State	Mine Name
Door seals, exhaust, floor material	$810	$250	PP-014-01M	WV	ABC
Add material to inside of cab, lower CB & stereo	$500	$200	PP-013-01C	PA	DEF
Re-line cab with acoustical materials and door seals	$900	$300	PP-013-03C	PA	GHI
Re-line cab with acoustical materials, fix Air cond.	$2,500	$500	PP-012-03M	WY	JKL
Average	**$1,177.50**	**$312.50**			
Standard Deviation	**$898.16**	**$131.50**			

Suggested Approach for Success

- identify the offending noise source(s)
- quantify the contribution of each source
- review the range of engineering and administrative control options
- install/adopt the most-cost-effective control(s)
- consider/adopt changes in work practices
- above all, use common sense!

MSHA

Helping you to work more safely in the mining industry.

REMEMBER

Safety and Health are Values!