

Development and Assessment of Controls Session

Coated Flight Bars & Mist System

Peter G. Kovalchik

Mining Hearing Loss Prevention Workshop
June 21-22, 2005

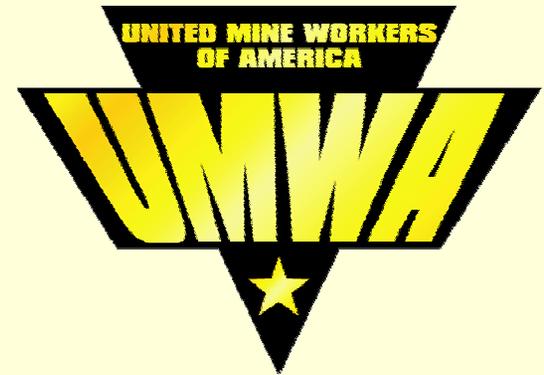


Pittsburgh Research Laboratory



Collaborators

BCOA

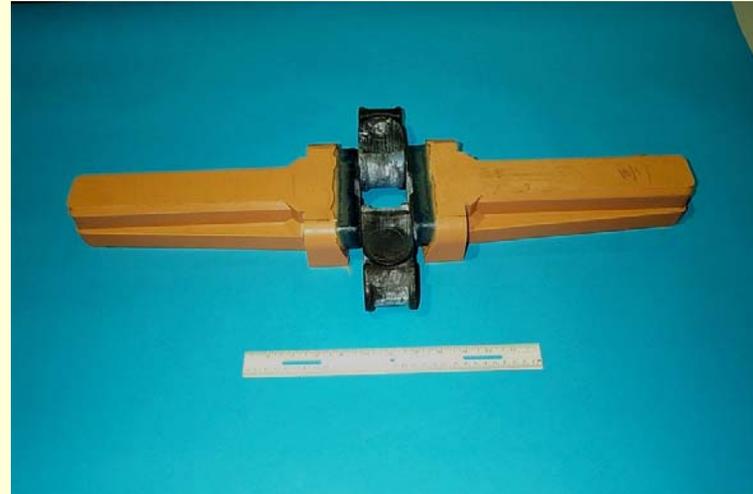


Coated Flight Bars



Polyurethane Coating (PO-650)

- Chain flight bars were coated with a durable polyurethane damping material.
- Objectives:
 - Minimize impact noise
 - Minimize scrapping noise



PROPERTIES

- Polyurethane Material - (PO-650)
- Durometer - 84A
- Compression Set - 45% max.
- Ultimate Tensile Strength - 6000 psi

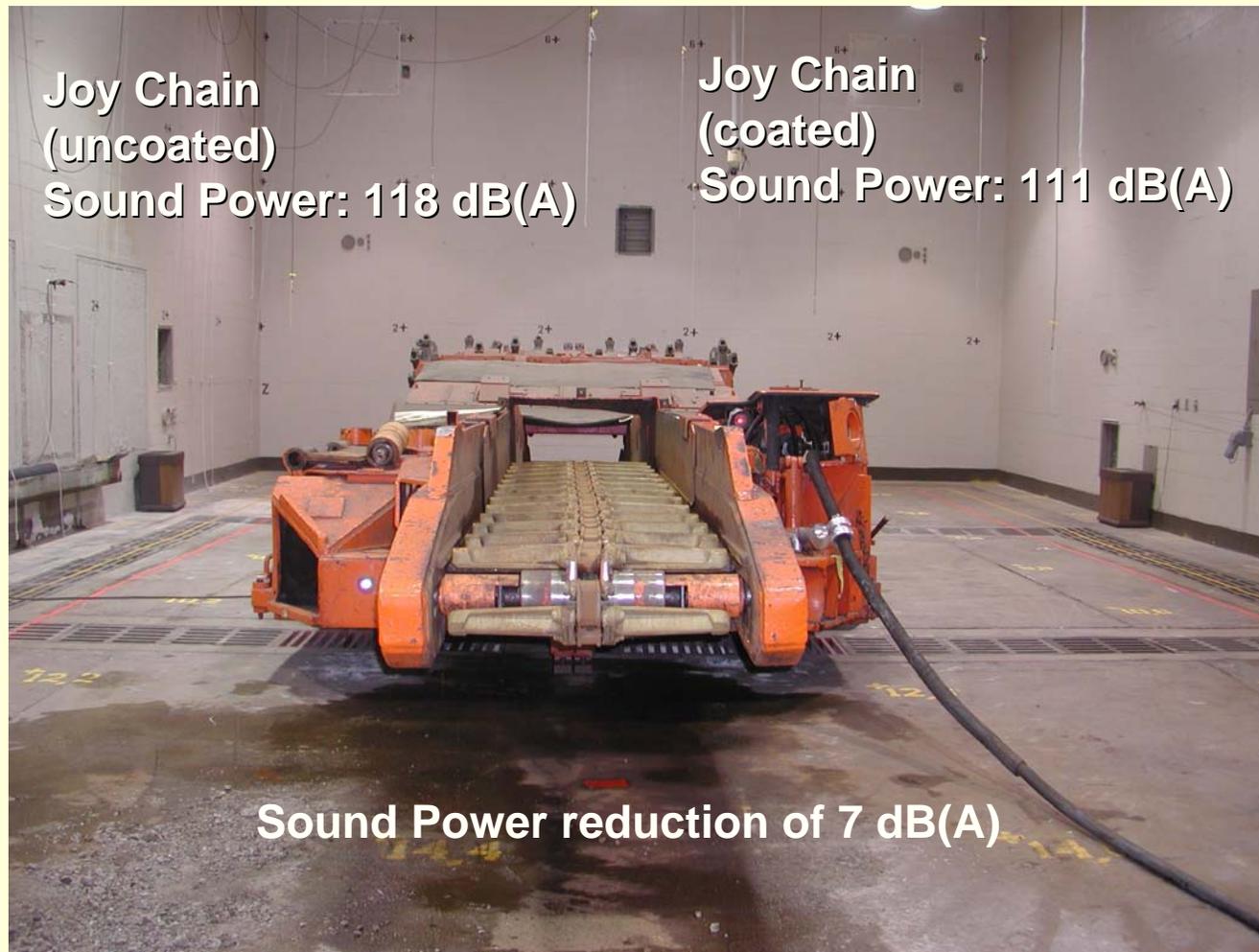
C.U.E. Inc.
11 Leonberg Road
Cranberry Township, Pa. 16066-3601
U.S.A.
Phone 724-772-5225
Fax 724-772-5280
Web: www.cue-inc.com



Note: Mention of specific brands does not imply endorsement by NIOSH.



Reverberation Chamber



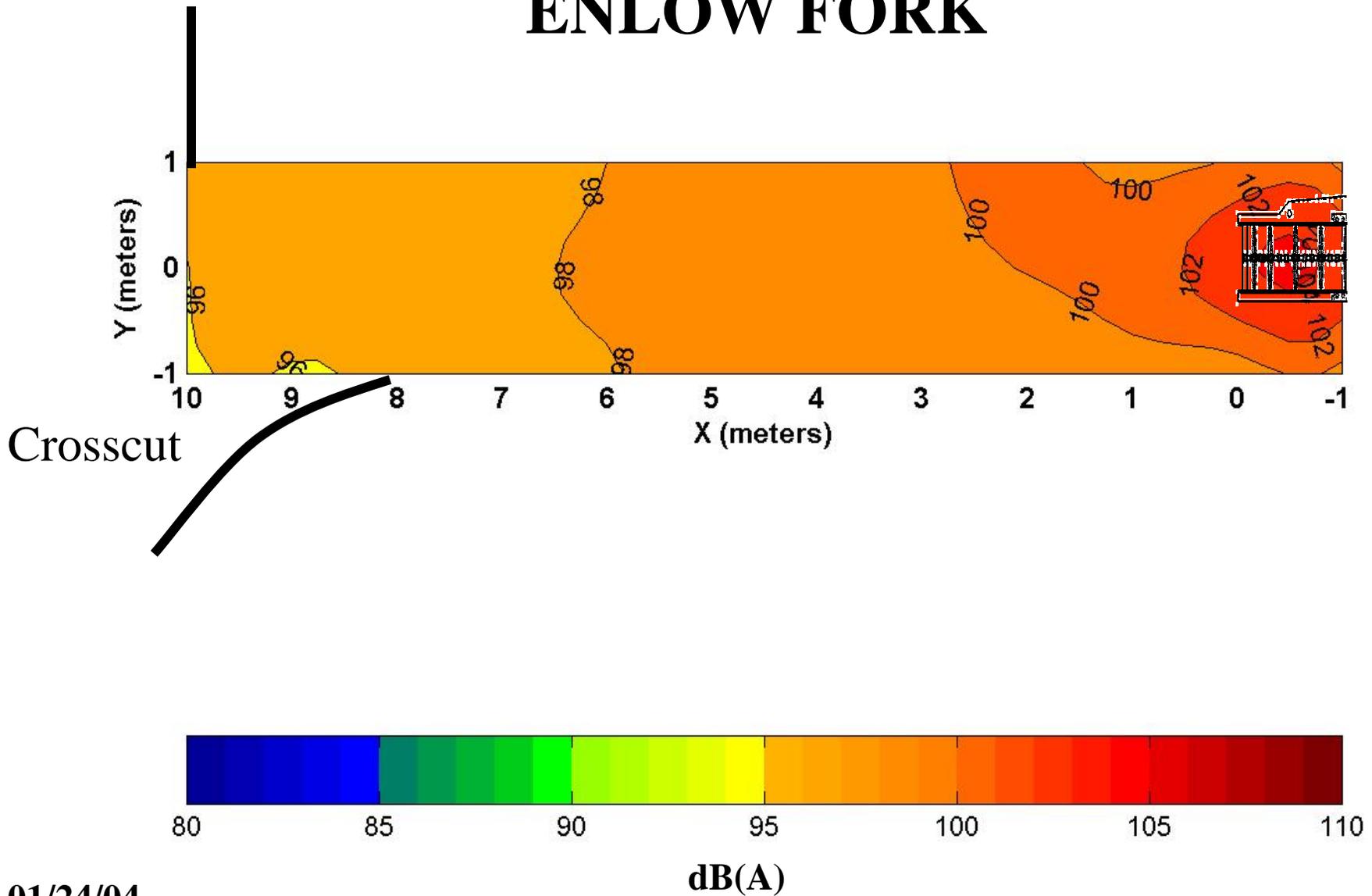


ENLOW FORK

UNCOATED CHAIN

01/24/04

30 INCH UNCOATED FLIGHT BARS ENLOW FORK



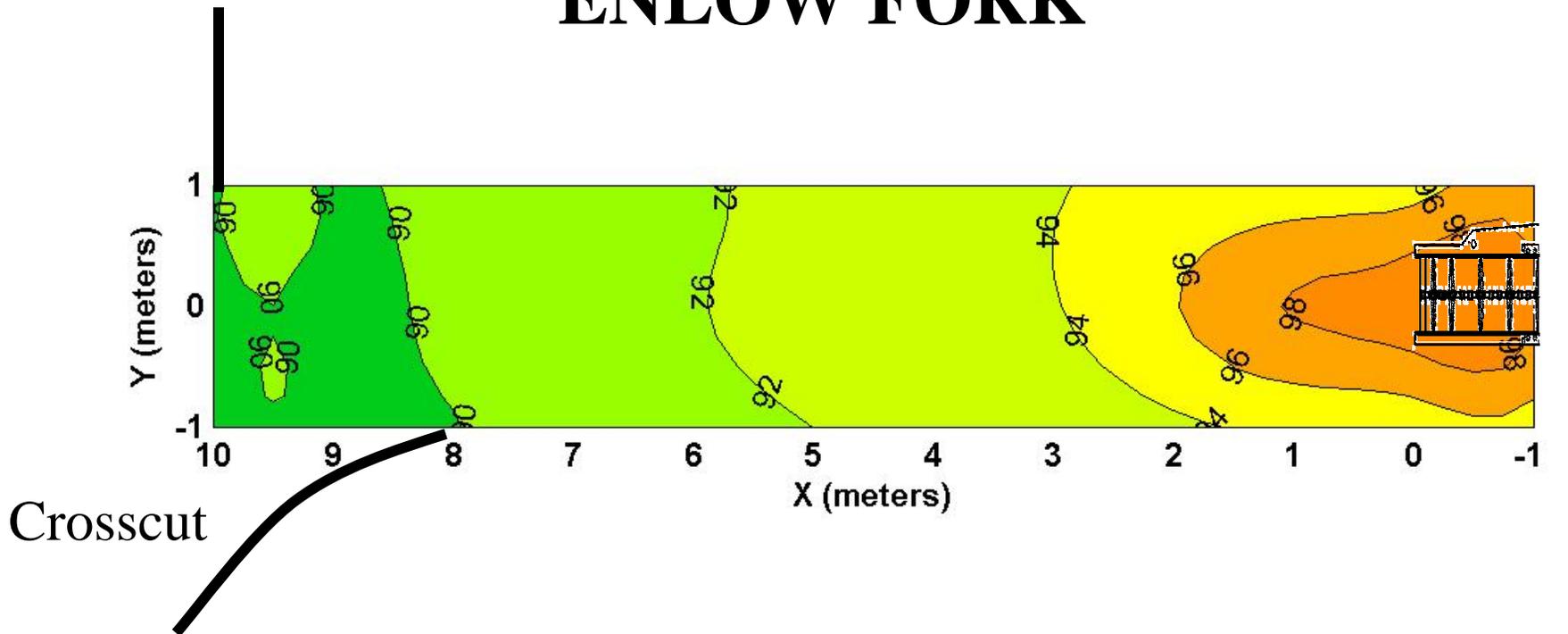
01/24/04



COATED CHAIN

01/24/04

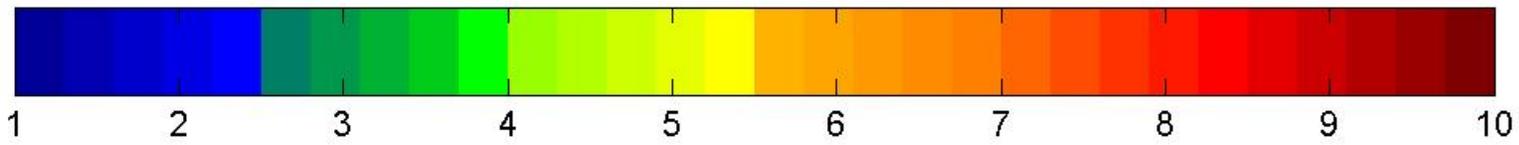
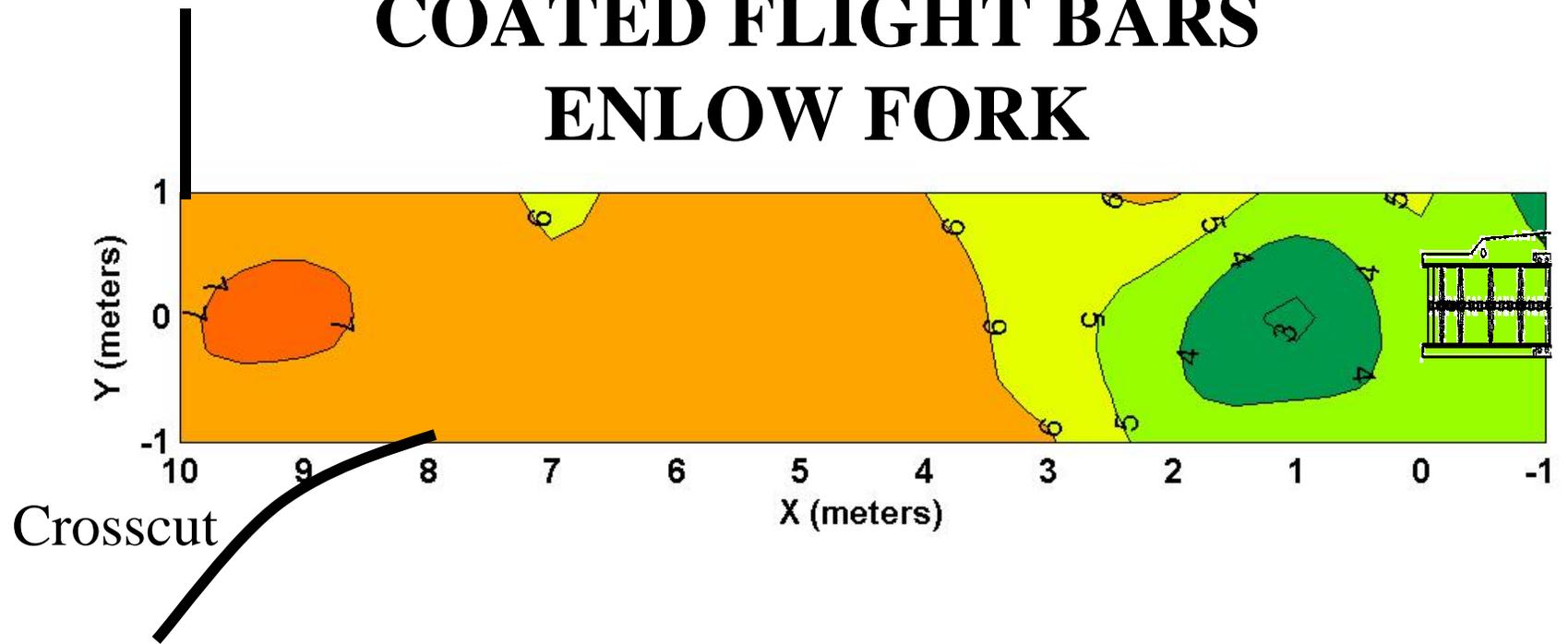
30 INCH COATED FLIGHT BARS ENLOW FORK



01/24/04

dB(A)

DIFFERENCE BETWEEN 30 INCH UNCOATED FLIGHT BARS & COATED FLIGHT BARS ENLOW FORK



dB(A)

01/24/04

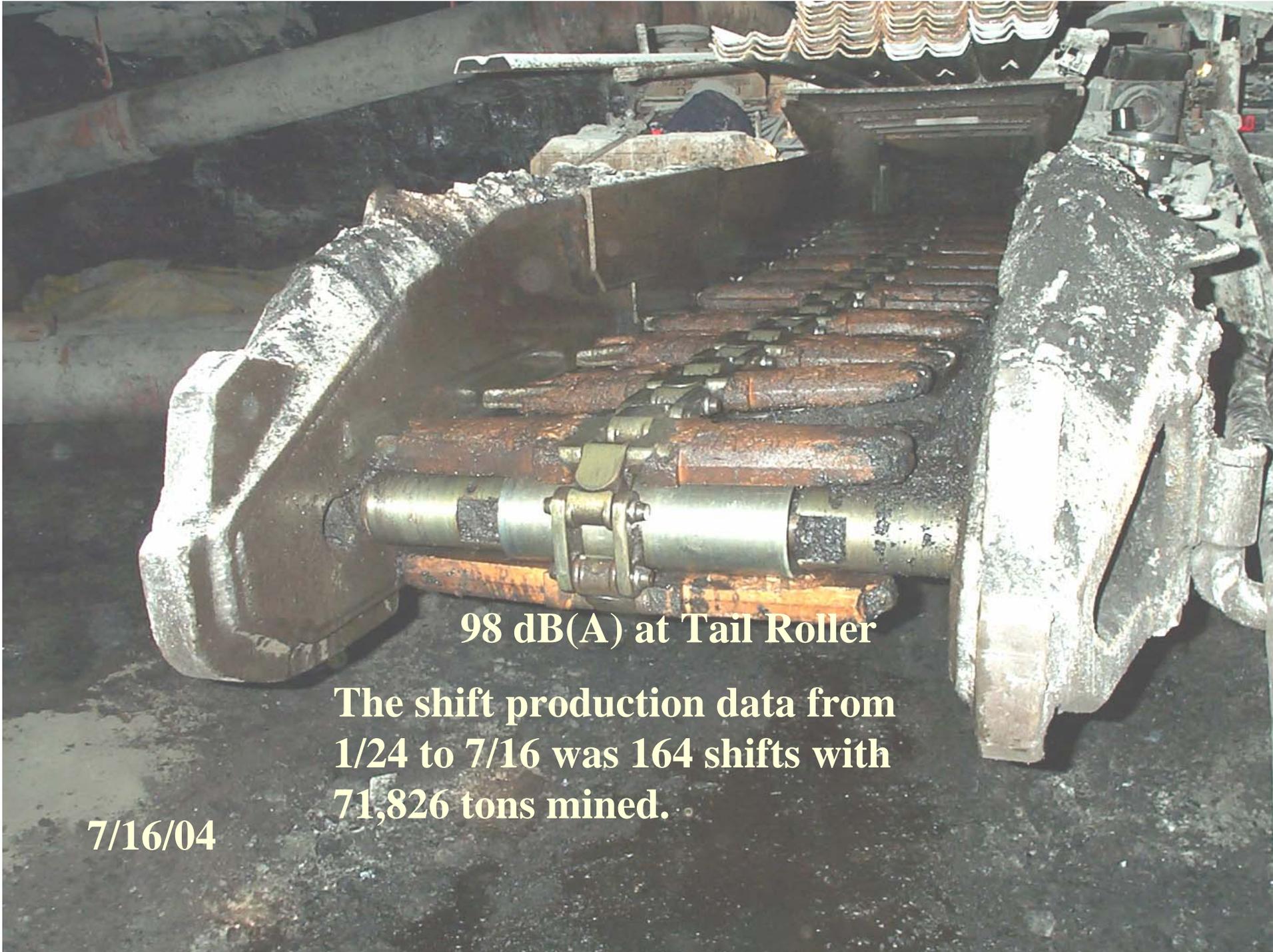
	Sound Pressure Level dB(A)	MSHA Dose (%)	NIOSH Dose (%)	MSHA Hours	NIOSH Hours
	80	25.0	31.5	32.00	25.40
	82	33.0	50.0	24.25	16.00
	85	50.0	100.0	16.00	8.00
	88	75.8	200.0	10.56	4.00
	90	100.0	317.5	8.00	2.52
	91	114.9	400.0	6.96	2.00
	94	174.1	800.0	4.59	1.00
	95	200.0	1,007.9	4.00	0.79
	96	229.7	1,269.9	3.48	.63
	97	263.9	1,600.0	3.03	0.50
Coated Chain	98	303.1	2,015.9	2.64	.4
	99	348.2	2,539.8	2.3	.31
	100	400.0	3,200.0	2.00	0.25
	101	459.5	4,031.7	1.74	.2
Uncoated Chain	102	527.8	5,079.7	1.52	0.16
	103	606.3	6,400.0	1.32	.13
	104	696.4	8,063.5	1.15	0.10
	105	800.0	10,159.4	1	.08
	106	919.0	12,800.0	0.87	0.06





The shift production data from 1/24 to 2/09 was 22 shifts with 12,500 tons mined.

02/09/04



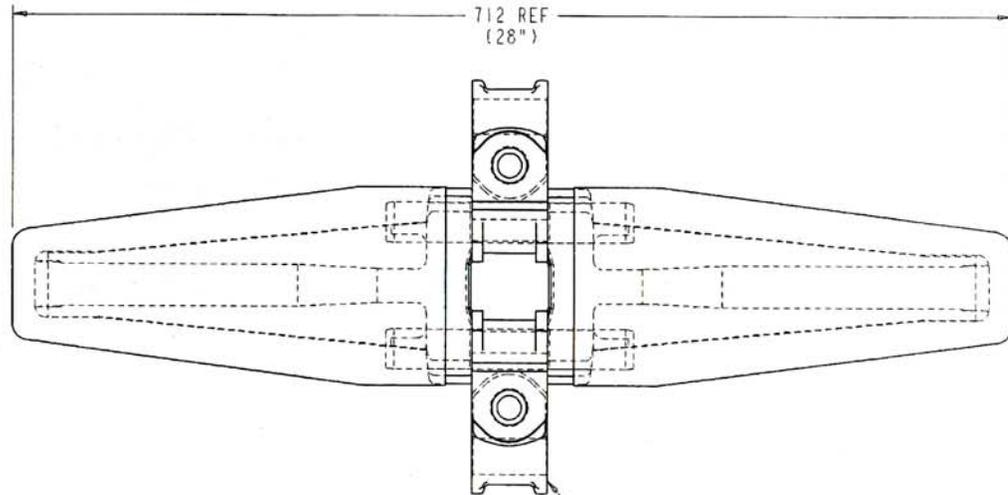
98 dB(A) at Tail Roller

**The shift production data from
1/24 to 7/16 was 164 shifts with
71,826 tons mined.**

7/16/04

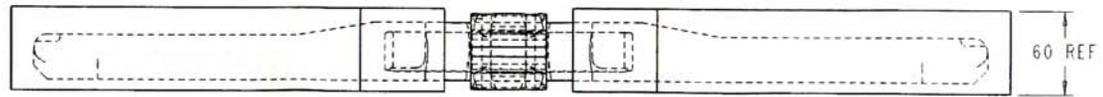
USWI 224-REHRHART... 100204667.01.1093496... PRINTED: .24-Mar-05

51-21-10-02



REF: 100204628

NOTE:
URETHANE COATING COMPOUND PO-650*/ COLOR TAN
USE MOLD No. 100168056



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GENERAL NOTES
1. WELDING SYMBOLS STANDARD TO ISO 2553 METHOD A.
2. REMOVE ALL BURRS & SHARP EDGES
3. ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE STATED.
4. THIRD ANGLE PROJECTION

FINISH SYMBOLS	
SM	MICRO
SW	MICRO
NS	0.1
NH	0.2
NR	0.4
NW	0.8
NT	1.6

TOLERANCES UNLESS OTHERWISE STATED	
MACHINING	±0.5
ANGULAR	±1/2°
FABRICATION & STRUCTURAL	
UP TO 300	±1
301 UP TO 1000	±2
1001 UP TO 2000	±3
OVER 2000	±5

MANUFACTURING SPECIFICATIONS	
PROTECT TREATMENT	
FABRICATION TOL'S	
MACHINING TOL'S	
FINISH SPEC	
MANUFACTURING SPEC	
WELDING SPEC	
HEAT TREATMENT	
HARDNESS	

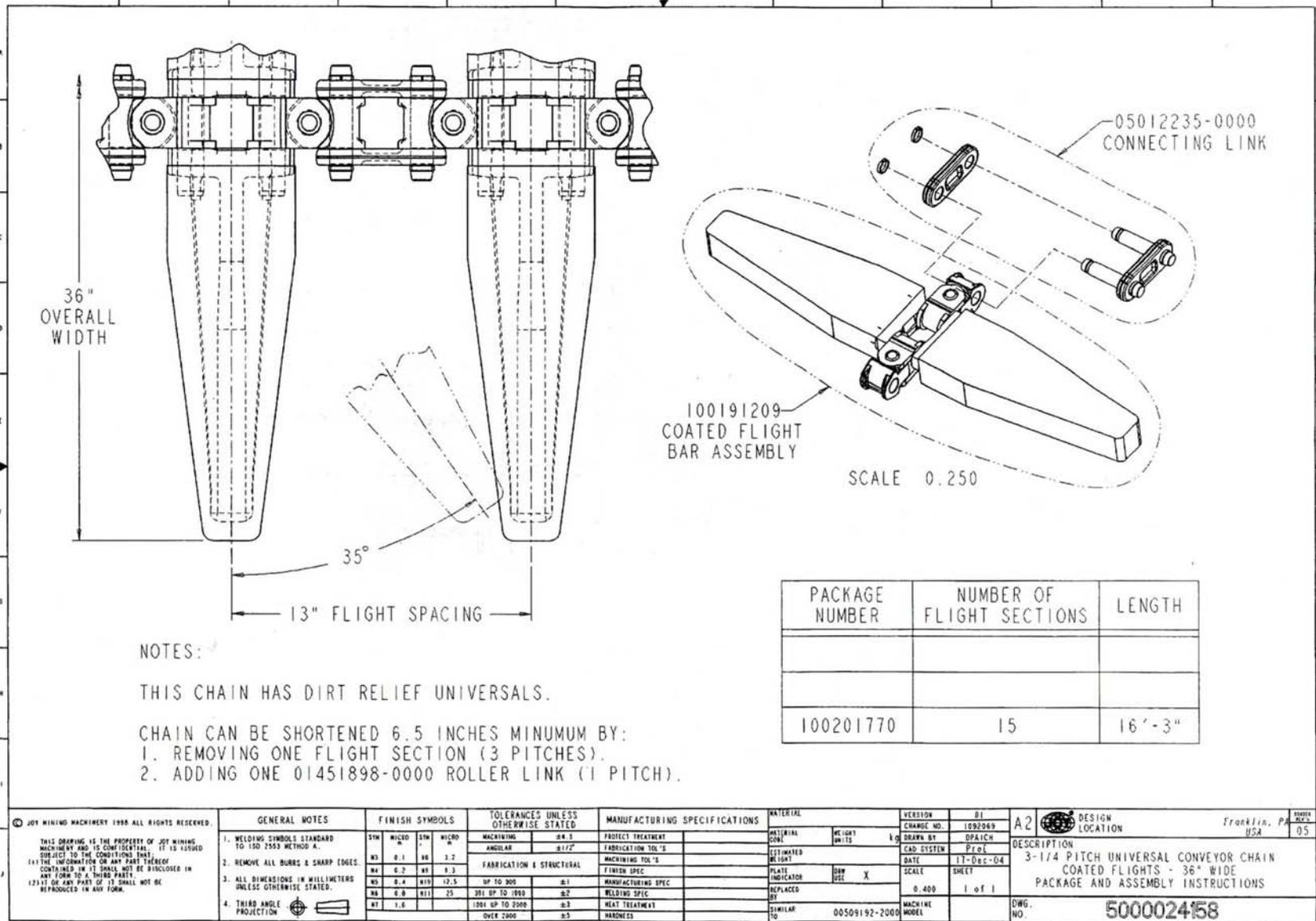
MATERIAL		SEE TABLE	
MATERIAL CODE	N/A	VERSION	01
WEIGHT UNITS	kg	CHARGE NO.	1053406
ESTIMATED WEIGHT	15	DRAWN BY	R. REHRHART
PLATE INDICATION	NONE	CAD SYSTEM	Prc
REPLACED BY		DATE	26-Jan-05
SIMILAR TO	100191209	SCALE	1 of 1
		MACHINE MODEL	MINERS

MATERIAL ASMB: 100204628

A2	DESIGN LOCATION	Franklin, PA USA	SHEET NO. 05
DESCRIPTION			
FLIGHT BAR ASSY, COATED			
DWG. NO.			100204667



JUS W1 224-REHRHART..... 5000024158. 01.1092069... PRINTED: .24-Mar-05



Summary

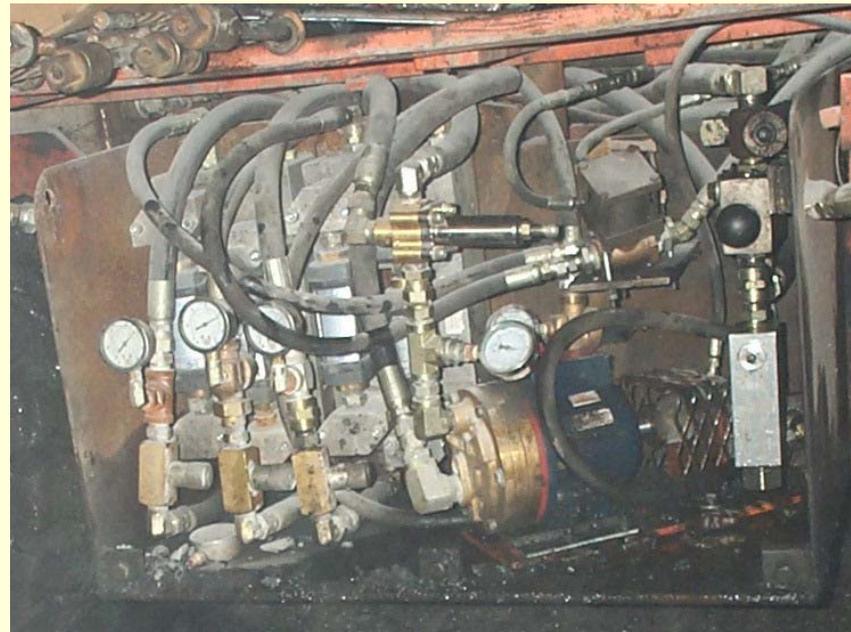
- Sound Power Reduction of 7 dB(A)
- Underground Sound Level Reduction of 4 dB(A)
- Durability - Minimal Wear after 6 months (mainly on the tips)
- Longer Chain Life
- Allowable Exposure Time was Increased by 1 Hour
- Promising noise controls on MSHA Program Information Bulletin P04-18

Mist Drilling System



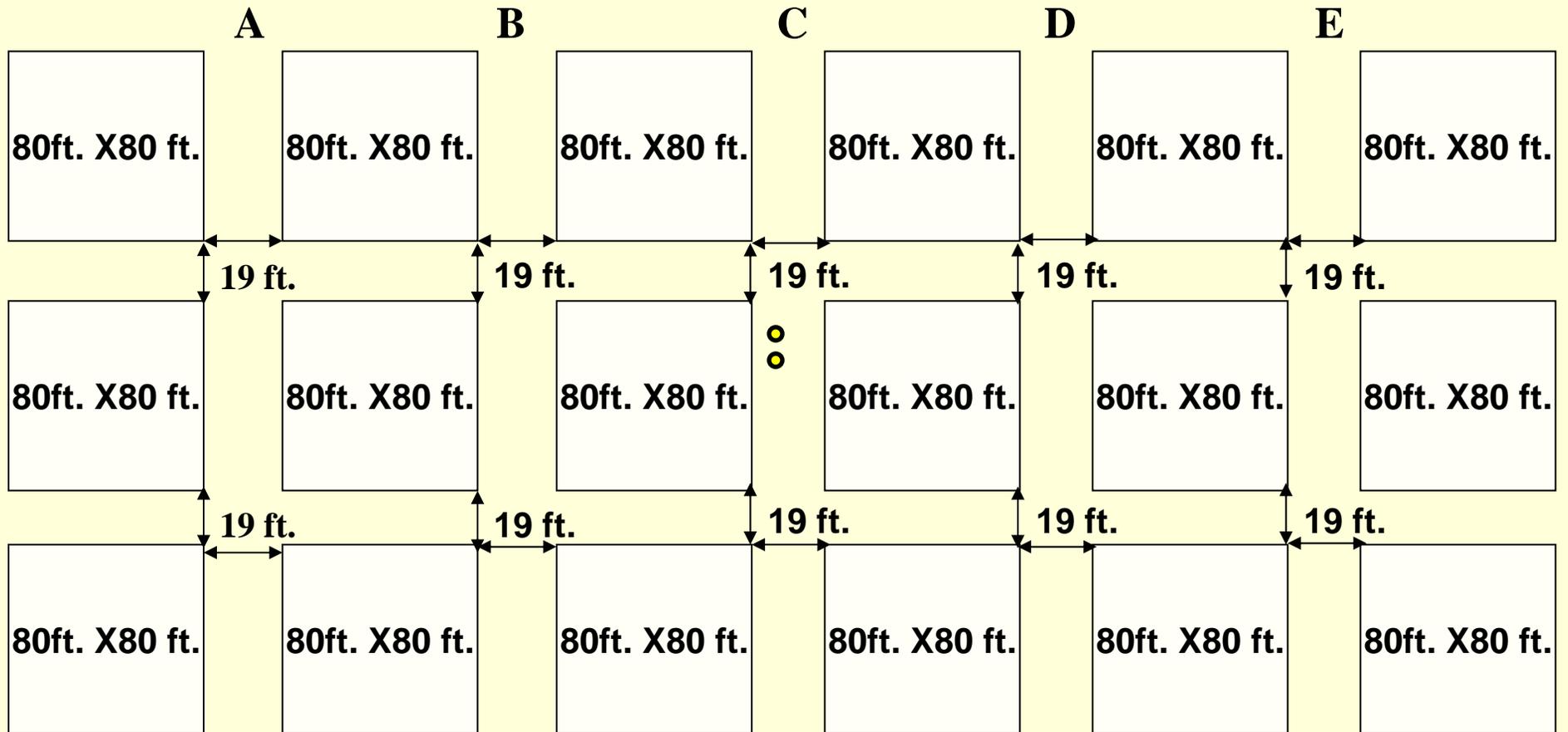
Mist System Specification

- Air
 - Flow : 20 cfm
 - Pressure: 110 psi
- Water
 - Flow : 1 gal/min
 - Pressure: 110 psi
 - Water Tank: 180 gal
- Operation
 - Air & Water pressures drop to 96 psi.



TILER #1 MINE

Mine Height 4 ft.
Coal Seam 32 to 40 inches



TILER #1 MINE

Drill Plan

Mine Height 4 ft.

Coal Seam 32 to 40 inches

Vacuum Drilling
Noise Measurement

C

X X X X

X X X X

X X X X

X X X X

80ft. X 80 ft.

80ft. X 80 ft.

Mist Drilling
Noise Measurement

X = Drill Holes

19 ft.

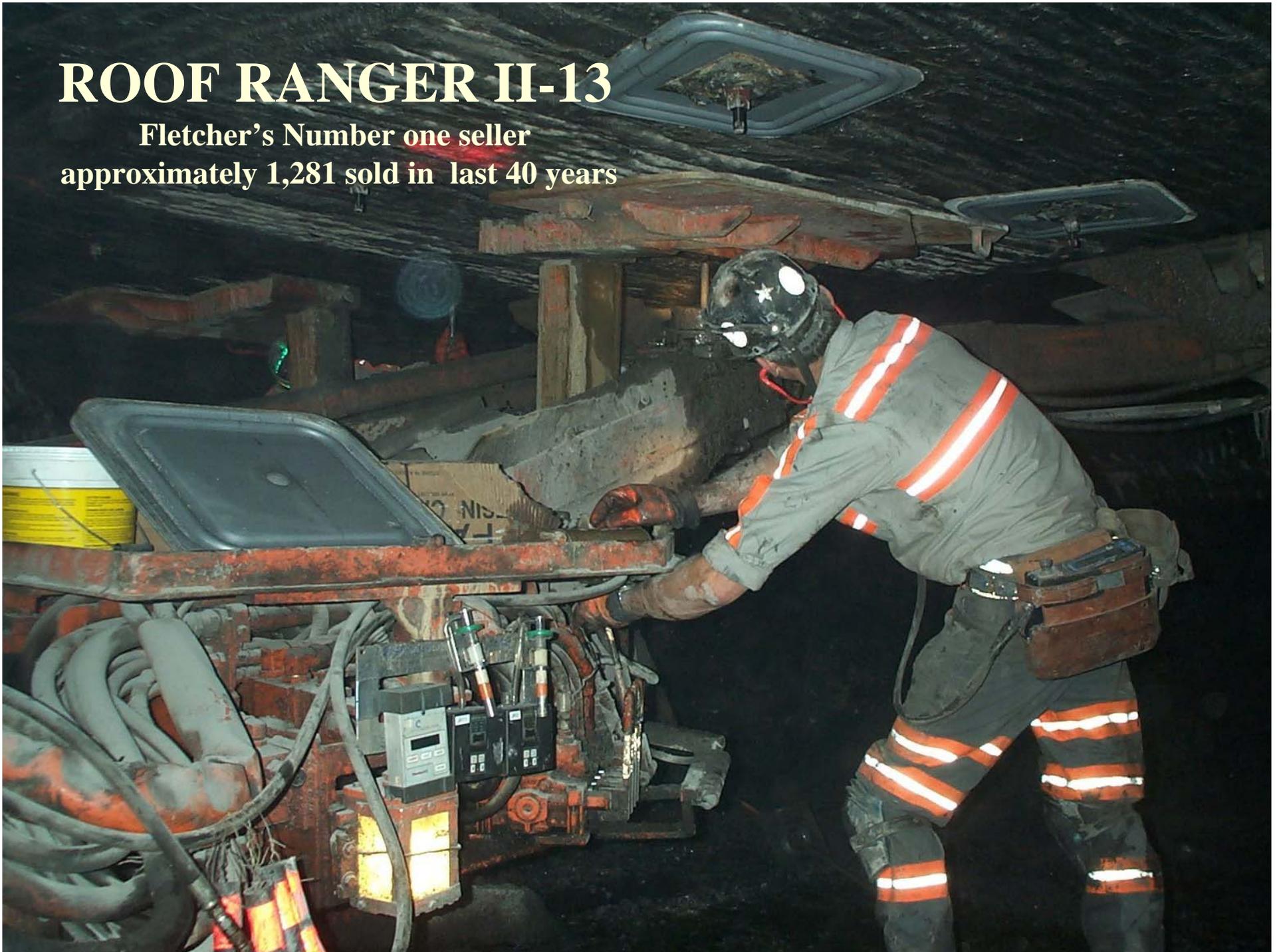


Evaluation

- Two Fletcher Roof Ranger II-13 roof bolting machines
 - One with standard dual boom setup for vacuum drilling
 - One with standard dual boom setup for wet drilling with a Joy mist System
- Drilling
 - Hole depth 5 ft
 - 1 in. bits
 - 3 ft round drill steel starter, then two 3 ft hex drill steel to finish.
 - Rotation & Thrust – Max?

ROOF RANGER II-13

Fletcher's Number one seller
approximately 1,281 sold in last 40 years

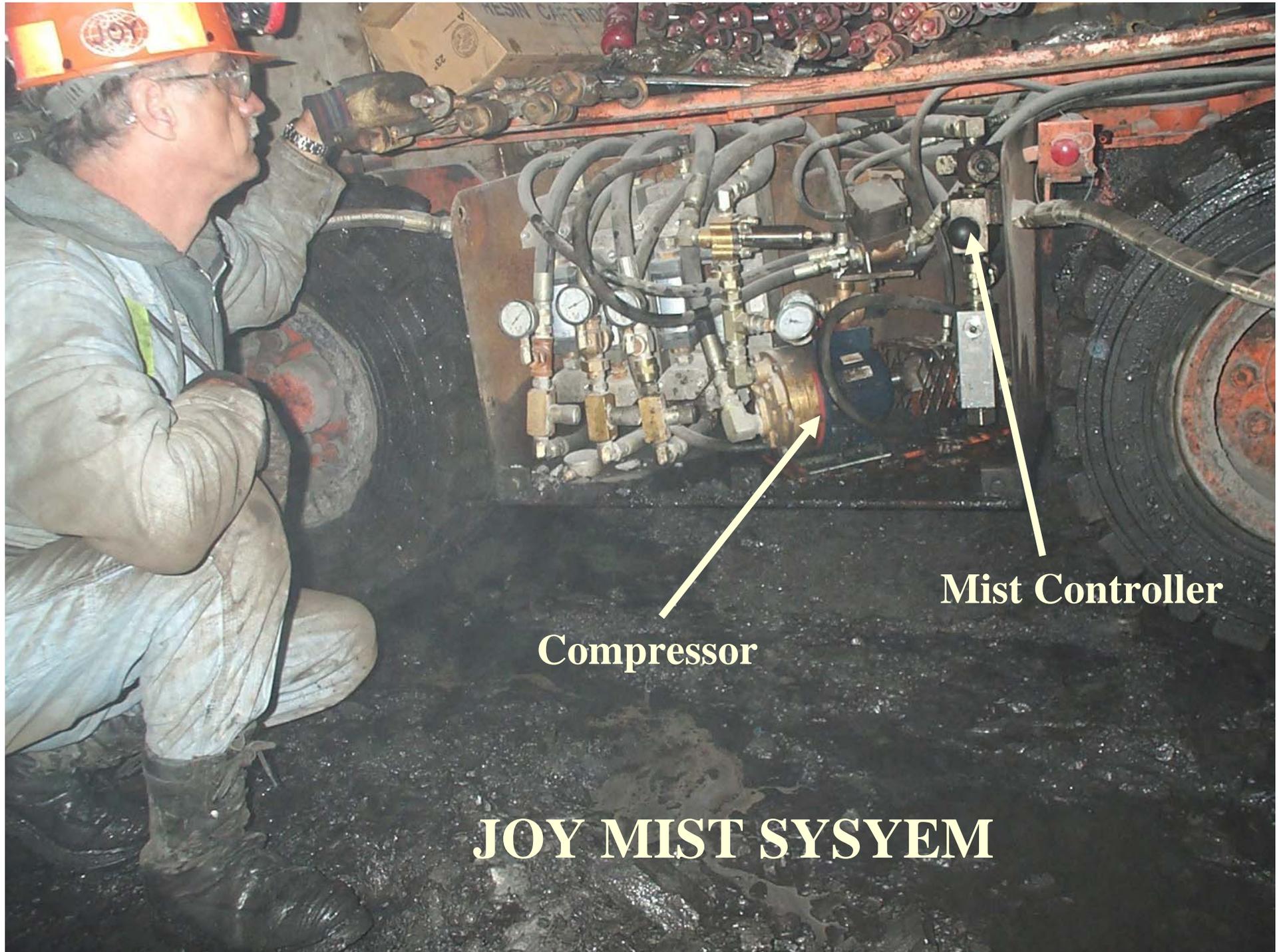




Water Tank 180 gal.

Mist Controller

JOY MIST SYSSYEM



Compressor

Mist Controller

JOY MIST SYSYEM

Summary - Underground Sound Pressure Measurements

Roof Bolting Machine Operation	Standard RR11 (Vacuum) dB(A)	Standard RR11 (Mist System) dB(A)
Idling	82	82
Mist System turned on, No drilling	NA	88
Drilling	101	99

	Sound Pressure Level dB(A)	MSHA Dose (%)	NIOSH Dose (%)	MSHA Hours	NIOSH Hours
	80	25.0	31.5	32.00	25.40
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	104	696.4	8,063.5	1.15	0.10
	105	800.0	10,159.4	1	.08
	106	919.0	12,800.0	0.87	0.06



Standard RRII (Vacuum)	Standard RRII (Mist System)
Hole depth = 60 in.	Hole depth = 60 in.
Drilling Time = 56 sec.	Drilling Time = 51 sec
Penetration Rate = 1.07 in/sec	Penetration Rate = 1.18 in/sec
Dose per hole = .9% per hole	Dose per hole = .6% per hole
Number holes / Allowable Exposure = 112 holes	Number holes / Allowable Exposure = 162 holes

WET



MIST



Less water than wet drilling

Summary

- Promising noise controls on MSHA Program Information Bulletin P04-18
- Longer bit life
- Less water
- Allowable Exposure Time was Increased

For more information

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Pittsburgh Research Laboratory

