NIOSH RECOMMENDED PROCEDURES FOR ASBESTOS BRAKE AND CLUTCH SERVICING

1. All procedures performed in a restricted area of facility. Entrances posted with an asbestos exposure warning sign.

2. Respiratory protection during all servici operations. MESA and NIOSH approved air purifying respirators.

3. Loose wear dust to be removed by well maintained shop vacuum. After vacuum cleaning, remaining material removed with water soaked rag.

4. All new lining grinding machines provided with local exhaust ventilation.

5. All floor and equipment cleaning performe with high efficiency shop vacuum.

6. Vacuum cleaner bag and all other waste sealed in plastic bags and labeled asbest warning label.

PRELIMINARY

TYPES OF FACILITIES PERFORMING AUTOMOTIVE BRAKE REPAIR

GARAGE TYPE	APPROXIMATE # FACILITIES	PERCENTAGE OF BRAKE WORK PERFORMED
Service Stations	195,000	~ 50
Independent Garages	108,000	~ 30
New Car Shops	39,000	~ 18
Fleet Shops	21,000	1-2

NIOSH Estimates That More Than 900,000 U.S. Workers Are Potentially Exposed To Brake Wear Dust.

SUMMARY OF BRAKE REPAIR JOBS FOR 1975 PRELIMINARY

VEHICLE AND JOB TYPE	MILLIONS OF WHEELS SERVICED
Automobiles	
New Shoes Installed	12.7
Relined Shoes Installed	38.3
Disc Brake Pad Sets Replaced	16.9
Trucks	
Brakes Relined	7.4
New Brakes Installed	2.5

SUMMARY OF FIBER EXPOSURES IN GARAGES ...
DETERMINED BY OPTICAL MICROSCOPY

PRELIMINARY

EXPOSURE SUMMARY	FIBER CONCENTRATION (FIBERS > 5µm/cc) GARAGE SURVEYED				
	A	B	C	D	E
Mechanic's Exposure					
Mean Daily TWA*	0.11	0.13	0.12	0.10	0.12
Range of Daily TWA Values	0.08 to 0.12	0.11 to 0.15	0.05 to 0.19	0.04 to 0.18	----
Garage General Air Concentrations					
Mean Daily TWA	0.07	0.09	0.05	0.07	0.04
Range of Daily TWA Values	----	----	----	----	----
Highest Peak Concentration Observed	0.58	2.33	0.72	15.33	0.16

*TWA = Time-weighted-average. NIOSH Recommended TWA = 0.10 fibers > 5µm/cc

PRELIMINARY RENEWING USED BRAKE AND CLUTCH ASSEMBLIES

FIBER CONCENTRATION (FIBERS >5 um/cc)				
FACILITY	RECEIVING & CLEANING	BONDING & RIVETING	CUTTING & GRINDING	INSPECTION & PACKAGING
A				
MEAN CONCENTRATION	1.1	0.6	1.1	0.7
RANGE	0.4-4.8	0.2-1.4	0.8-1.6	6.8-1.1
# SAMPLES ( )	(15)	(20)	(6)	(4)
B				
MEAN CONCENTRATION	4.0	2.7	5.0	
RANGE	1.0-7.6	1.1-5.8	1.5-9.3	------
# SAMPLES ( )	(5)	(6)	(6)	
C				
MEAN CONCENTRATION	1.3		0.8	
RANGE	1.2-1.3	------	0.6-1.3	------
# SAMPLES ( )	(2)		(2)	

NIOSH Recommended Standard = 0.10 fibers >5µm/cc

PRELIMINARY

SUMMARY OF ASBESTOS FIBER EXPOSURES IN FRICTION PRODUCT PRODUCTION FACILITIES AS DETERMINED BY OPTICAL MICROSCOPY

	FIBER CONCENTRATION (FIBERS > 5μm/cc)				
PLANT	MIXING & FORMING	HOT PRESSING & CURING	GRINDING, CUTTING & DRILLING	BONDING & RIVETING	INSPECTION & PACKAGING
A MEAN CONC RANGE # SAMPLES ( )	0.7 0.0- 2.5 (29)	0.6 0.0-3.8 (19)	0.8 0.0- 3.6 (39)	0.4 0.0-1.3 (9)	2.3 0.0-10.3 (32)
B MEAN CONC RANGE # SAMPLES ( )	1.7 0.0- 8.4 (59)	1.2 0.2-7.0 (44)	2.2 0.0-17.5 (72)	1.5 0.3-5.7 (13)	1.2 0.1- 4.6 (32)
C MEAN CONC RANGE # SAMPLES ( )	9.9 1.5-18.4 (19)	5.2 2.7-7.4 (10)	6.6 1.1-22.1 (40)	------	5.1 0.7-11.1 (4)
D MEAN CONC RANGE # SAMPLES ( )	0.8 0.1- 2.0 (5)	1.1 1.0-1.3 (2)	2.3 0.4-20.5 (15)	0.2 ------ (1)	0.9 0.1- 3.4 (6)

PRELIMINARY

SUMMARY OF ASBESTOS FIBER EXPOSURES IN FRICTION PRODUCT PRODUCTION FACILITIES AS DETERMINED BY OPTICAL MICROSCOPY

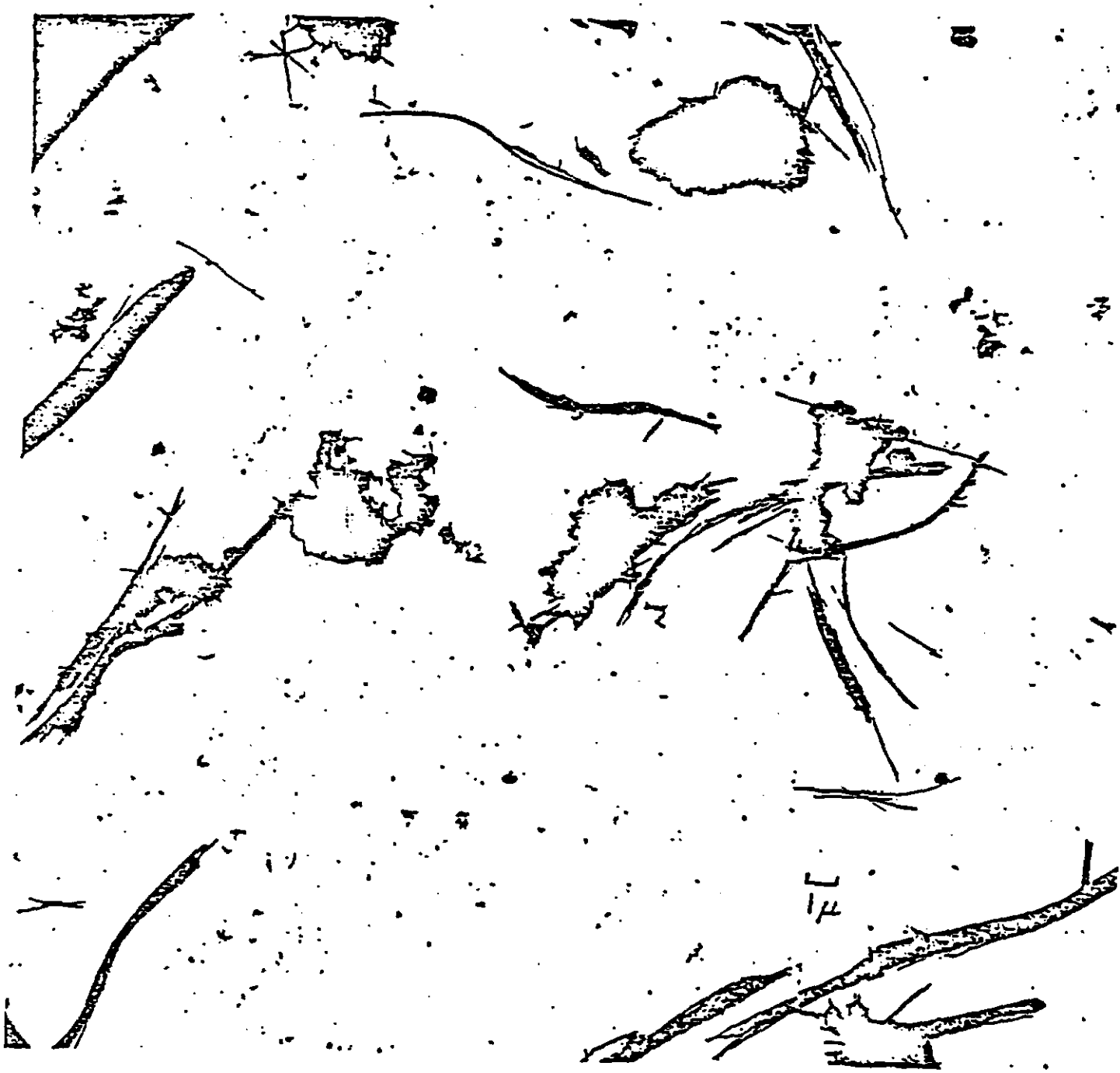
	FIBER CONCENTRATION (FIBER > 5μm/cc)				
PLANT	MIXING & FORMING	HOT PRESSING & CURING	GRINDING, CUTTING & DRILLING	BONDING & RIVETING	INSPECTION & PACKAGING
E MEAN CONC RANGE # SAMPLES ( )	4.5 0.6-16.2 (10)	1.8 0.3-3.7 (14)	5.8 0.6-14.4 (11)	------	2.9 0.5- 5.4 (7)
F MEAN CONC RANGE # SAMPLES ( )	7.1 0.3-77.5 (23)	11.9 0.1-3.6 (20)	9.2 0.2-61.8 (14)	0.21 ------ (1)	19.0 0.5-105.0 (14)

NIOSH Recommended TWA = 0.1 Fibers >5μm/cc

FRICTION PRODUCT OPERATIONS

INDUSTRY AND OPERATION	GEOMETRIC MEAN μM	% OF FIBERS >5μM
PRODUCT MFG.		
RAW MATERIAL MIXING	1.3	9.8
PRODUCT FORMING	1.4	9.2
FINISHING	1.8	17.2
GARAGE REPAIR OPERATIONS		
BRAKE MECHANIC	<1.0	<1

AIRBORNE PARTICULATES IN FRICTION PRODUCT PRODUCTION FACILITY



PRELIMINARY

PRELIMINARY

PRELIMINARY RESULTS OF GARAGE LEAD EXPOSURE STUDIES

	LEAD CONCENTRATION µg/m3
Peak Exposure Using Compressed Air For Cleaning Wear Dust	2,660*
Brake Reassembly	20
Garage General Air	10

*- These values do not represent time-weighted-average exposures.

OSHA Proposed Lead TWA = 100 $\mu g/m^3$

SUMMARY OF LEAD EXPOSURES IN FRICTION PRODUCT PRODUCTION FACILITIES

PRELIMINARY

	LEAD CONCENTRATION ($\mu g/m^3$)				
PLANT	MIXING & FORMING	HOT PRESSING & CURING	GRINDING, CUTTING & DRILLING	BONDING & RIVETING	INSPECTION & PACKAGING
A					
MEAN CONC	28	2	8	4	5
RANGE	<1-89	<1-3	4-15	2-6	<1-8
# SAMPLES ( )	(4)	(4)	(6)	(2)	(4)
B					
MEAN CONC	7	19	4	4	3
RANGE	2-11	2-55	3-7	2-6	<1-5
# SAMPLES ( )	(6)	(4)	(6)	(2)	(4)
C					
MEAN CONC	729	8	6	------	6
RANGE	2-7000	3-16	1-11		2-10
# SAMPLES ( )	(22)	(4)	(7)		(2)

Proposed OSHA Lead TWA = 100 $\mu g/m^3$

PRELIMINARY

SUMMARY OF LEAD EXPOSURES IN FACILITIES RENEWING USED BRAKE AND CLUTCH ASSEMBLIES

	LEAD CONCENTRATION ($\mu g/m^3$)			
FACILITY	RECEIVING & CLEANING	BONDING & RIVETING	CUTTING & GRINDING	INSPECTION & PACKAGING
A				
MEAN CONCENTRATION	187	79	77	77
RANGE	60-700	40-170	50-100	40-70
# SAMPLES ( )	(15)	(20)	(6)	(4)
B				
MEAN CONCENTRATION	34	9	16	
RANGE	6-80	2-41	2-57	------
# SAMPLES ( )	(5)	(6)	(5)	
C				
MEAN CONCENTRATION	3		3	
RANGE	2-4	------	2-4	------
# SAMPLES ( )	(2)		(2)	

OSHA Proposed TWA = 100 $\mu g/m^3$

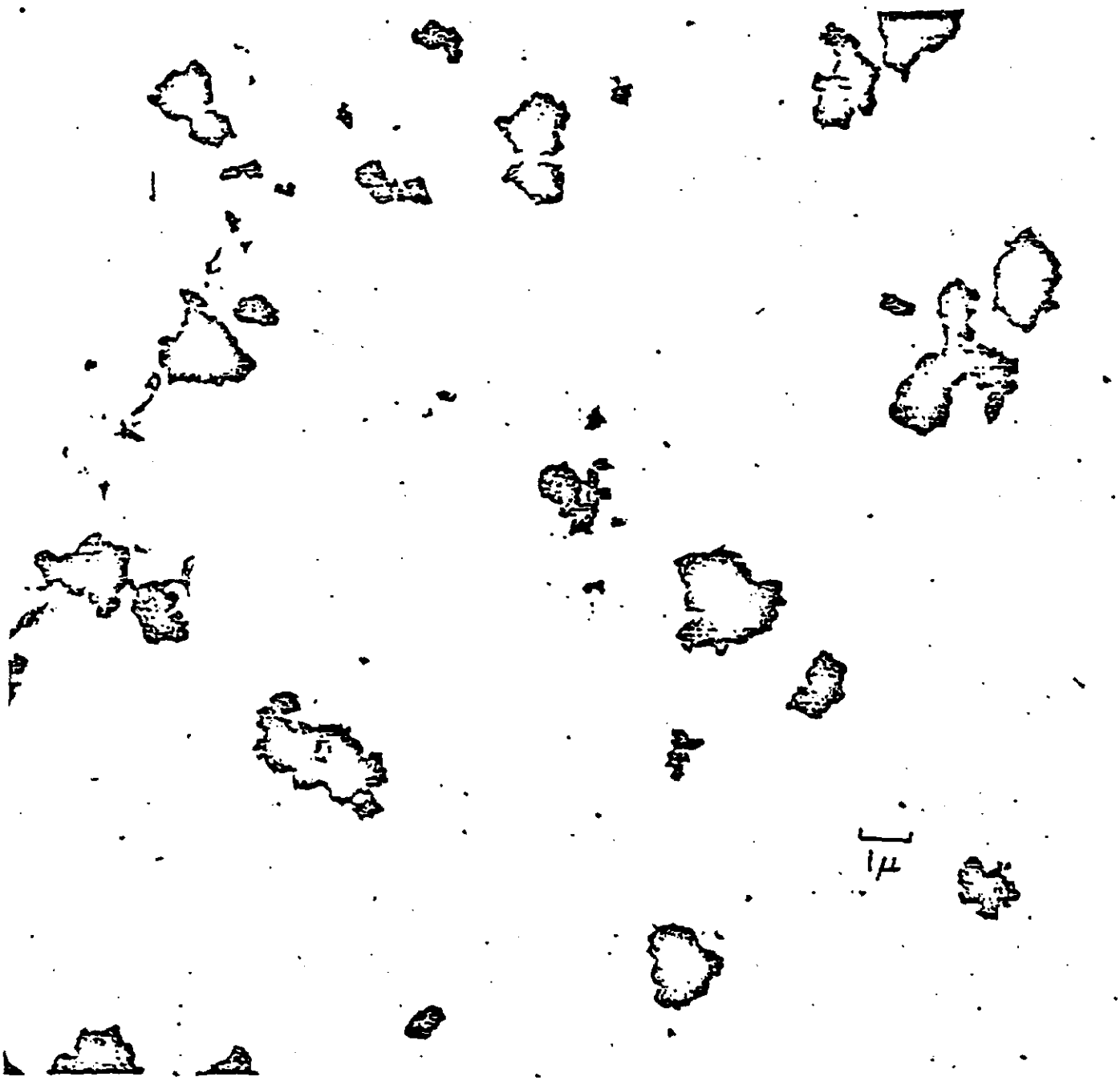
SUMMARY OF LEAD EXPOSURES IN FRICTION PRODUCT PRODUCTION FACILITIES

PRELIMINARY

	LEAD CONCENTRATION ($\mu g/m^3$)				
PLANT	MIXING & FORMING	HOT PRESSING & CURING	GRINDING, CUTTING & DRILLING	BONDING & RIVETING	INSPECTION & PACKAGING
D					
MEAN CONC	4	3	14	<2	
RANGE	1-12	2-4	1-77	1-3	------
# SAMPLES ( )	(4)	(3)	(6)	(4)	
E					
MEAN CONC	17	2	5	------	3
RANGE	3-45	2-2	<1-17		1-5
# SAMPLES ( )	(4)	(3)	(4)		(4)
F					
MEAN CONC	3	<1	1	------	3
RANGE	1-4	<1-1	1-2		<1-8
# SAMPLES ( )	(2)	(4)	(5)		(4)

Proposed OSHA Lead TWA = 100 $\mu g/m^3$

AIRBORNE PARTICULATE IN GARAGE PERFORMING BRAKE REPAIR



PRELIMINARY