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SPECIAL ASBESTOS DUST
&
PRELIMINARY INDUSTRIAL HYGIENE SURVEY

ABEX CORPORATION
American Brakeblok Division
Winchester, Virginia

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INTRODUCTION

During the week of February 7-11, 1972, a special asbestos dust survey and a preliminary industrial hygiene were conducted at the American Brakeblok Division of the Abex Corporation, Winchester, Virginia. The main purpose of the asbestos dust survey was to evaluate the asbestos sampling technique used by the U.S. Public Health Service.

To date, the samples which were collected have not been analyzed; however, from past U.S.P.H.S. surveys and the present industrial hygiene survey, several conclusions can be drawn. The following paragraphs discuss plant operations and industrial hygiene practices along with conclusions and recommendations.

DESCRIPTION OF THE PLANT

The plant is located south of the city of Winchester and employs approximately 655 blue collar workers and 119 white collar workers. There is a doctor employed by Abex Corporation but he only visits this facility once or twice a year. A nurse is on duty full time however. A complete pre-employment physical is given and is repeated every two years. Chest X-rays are taken every year. Blood and urine samples are taken twice a year from those in the mixing area to check for lead. Abex employs an industrial hygienist full time. The Personnel Manager acts as the Safety Director and works through the foremen to implement safety programs.

The plant was constructed by Abex in 1947 for the purpose of manufacturing asbestos friction products. The total plant site consists of 44 acres with four main buildings amounting to 440,000 square feet. The buildings are two story structures with the mixing operations and dust collectors being located on the upper level.

Products of the plant include automotive, aircraft and industrial braking materials, ABK industrial bearings, and sintered metallic material for production of metallic friction products. Approximately 50 different braking material mixes are made by the company in order to comply with varying customer needs and specifications.

DESCRIPTION OF THE PROCESSES

Both extruded and dry process brake linings are made along with ABK bearing material. Sintered metallic materials are made in a separate building

and does not involve the use of asbestos. The following paragraphs give a brief description of the operations which make use of asbestos fibers.

A. Dry Process Brake Linings

The process by which dry process brake linings are made consists of the following steps:

1. Mixing
2. Preforming and Blending
3. Hot Pressing
4. Cutting and Trimming
5. Curing
6. Final Grinding and Drilling

Raw material mixing is done on the second floor. The various raw materials used in each mixture are dumped into a "Nauta" type mixer which thoroughly mixes the materials and empties to conveying carts on the first floor.

After the materials are mixed they are taken to preform stations where initial forming takes place. Preforming consists of placing a prescribed amount of mix into a mold and pressing with a hydraulic press until the materials cling together as one mass.

Following the preforming operations, the brake blocks are placed in a hot press for a period of approximately two hours. Hot pressing serves the purpose of allowing the resins to further bond the materials into a rigid body.

Finally, the blocks are ground to the proper thickness, drilled with the proper holes, inspected and packaged for shipment. Blocks are labeled with a brander machine.

B. Extruded Brake Linings

Extruded brake linings are made in the following steps:

1. Raw Material Mixing & Grinding
2. Extruding
3. Baking
4. Cutting
5. Final Curing
6. Final Grinding and Drilling

Raw material mixing is done in a manner similar to dry process lining productions, the only difference being that oils are added to form a damp paste. After the materials are mixed, they are emptied into conveying carts on the ground floor.

After mixing, the raw materials are extruded in the form of a tape which is wound into a coil. The coil is then placed in an oven for initial curing.

Following the initial curing operation, the coils are surface ground and cut to length on band saws. Depending on customer specifications, the lining may undergo another curing operation.

Finally the linings are drilled with the proper holes, finish ground, inspected, and packaged for shipment.

C. ABK Industrial Bearings

ABK industrial bearings are special wear and heat resistant bearing made by the company. The bearings are made by first impregnating a cloth with various resins and then winding this cloth or hot pressing it to form the product. These bearings are used quite extensively in iron and steel foundries.

SURVEY PROCEDURES

The main purpose of the asbestos dust survey conducted at the plant was to evaluate the asbestos sampling technique currently used by the U.S. Public Health Service. To do this, simultaneous samples were taken (85 pairs on the same side of the man and 23 sets on opposite sides) to check the reproducibility of the asbestos sampling under field conditions with relatively low concentrations. The majority of the sampling was conducted at the same machines in the cutting, grinding and drilling of auto linings for three consecutive days on the first and second shift in order to also supply data on variations of concentration of asbestos with the shift and day of week. The remainder of the samples came from the preforming and hot press areas. A special study was done to determine the effect of heavy background on sample results.

A preliminary industrial hygiene survey of the plant was also conducted to try to evaluate general housekeeping and ventilation systems.

INSPECTION OF THE PLANT

Potential Health Hazards: The major potential health hazards encountered were:

1. Exposure to asbestos dust
2. Exposure to lead from mixing operations

Caution needs to be exercised toward some of the raw materials (see Table 1) that are encountered. Indiscriminate use of such things as carbon black, litharge, and hexamethylenetetramine would be hazardous. Also, noise levels could be excessive in some areas.

Personal Protection: The only worker in the plant seen wearing a respirator was in the hot press area. Safety clothing such as rubber aprons and ear protection are provided where appropriate. Safety glasses are required of everyone inside the manufacturing area. There is a program to finance the purchase of safety shoes, but this is voluntary.

Ventilation: Local exhaust ventilation is used quite extensively with ductwork at almost all operations. The contaminated air is vented to 22 American Air Filter "Roto-Clone" type "N" wet dust collectors with a total design capacity of 314,740 cfm. Design specifications are given in Table 3. None of this air is recycled. The sludge from the wet collectors is taken through a series of three settling ponds to clear the water. A pumping station is located at the last pond to recycle some water. The water is evaporated and absorbed so none of it is allowed outside company property. Sludge is cleaned from the ponds about once a year and piled in mounds on company property.

Make-up air is provided, but not enough to prevent a noticeable negative pressure inside the plant. The total capacity of the make-up air is 155,000 cfm from 10 units.

Ventilation layouts of areas sampled during the special survey are shown in diagrams 2 and 3. Table 4 gives the results of the ventilation survey.

The method used to make the mixes is good in that raw materials are not handled by hand. A cart goes down a rail and under a series of hoppers each containing a part of the mix. The mixer stops the cart at the appropriate hopper and puts in that chemical. Each hopper is ventilated individually. The nice part about this system is that the chemicals are loaded by vacuum lines into the hoppers. Unfortunately asbestos cannot be included in this method since it is not a loose powder and is broken into the mix cart at the end by hand.

It appeared that the collection and disposal part of the ventilation system is adequate and performing as designed, but improvements could be made in the duct work and especially the hooding. The duct velocities are quite high, but more emphasis should be placed on using enclosed or flanged hooding as near the source of dust evolution as possible.

Housekeeping: In general the housekeeping was good. There is usually sufficient space in the aiseways. Painting and a general cleanup was in progress during the time of the survey. Brooms and a large vacuum floorsweeper were used for cleaning. The major problem in housekeeping was the frequent use of compressed air to blow off machinery.

CONCLUSIONS AND RECOMMENDATIONS

From this and past surveys, it appears that the areas of potentially excessive asbestos dust exposures are the mixing and preforming areas. The following are recommendations for some changes which are necessary to improve conditions at the plant:

1. A method needs to be developed for loading asbestos into the mixers which would eliminate hand loading. Until such a method is developed, asbestos mixers should wear Bureau of Mines approved respirators.
2. Ventilation improvements are indicated at the preforming stations. One such improvement would be to place hoods closer to the area of dust generation and use a more enclosing type hood. Another method would be to automate the block preforming operation as has been done for disc brake preforming.
3. More make-up air should be provided to prevent ventilation systems from being starved for air.
4. Once the modifications have been done on the ventilation systems and the systems are balanced, all blast gates should be welded in position to prevent them from being altered.

A P P E N D I X

TABLE

TITLE

1	Potentially Hazardous Raw Materials
2	Abbreviations Used in Ventilation Diagrams
3	Dust Collector Design Data
4	Results of Ventilation Survey
5	Results of Past Surveys

FIGURE

TITLE

1	Diagram of Plant Layout
2	Ventilation in Preform Area
3	Ventilation in Finishing Area

TABLE I

*POTENTIALLY HAZARDOUS RAW MATERIALS
USED BY
ABEX CORPORATION
AMERICAN BRAKEBLOK DIVISION*

1. Asbestos Fiber
2. Litharge
3. Lead Powder
4. Hexamethylenetetramine
5. Phenolic Resin & Polyrez Resin
6. Paints
7. Carbon Black
8. Coal
9. Zinc Dust & Zinc Powder
10. Nuisance Dusts

TABLE II

ABBREVIATIONS USED IN VENTILATION DIAGRAMS

<u>Abbreviation</u>	<u>Meaning</u>
DP	Drill Press
EG	Edge Grinder
MD	Multipress Drill
PF	Preforming Station
R	Ripper
S	Band Saw
SG	Surface Grinder

The following ventilation diagrams use the above codes and denote where the sampling was done during the special survey at Winchester in the preforming and finishing area.

TABLE III

WINCHESTER DUST COLLECTORS

ENGINEERING BULLETIN - #49

See PE-W404

APR 19 1971

Collector #	Location	Department Served	Type & Size	Motor				Fan				Interlocked w/ heater #	Pump			JRS File # W-10	Control Drawing pg.	Blowpipe Drawing pg.	Blowpipe Installed	Collector Installed	Collector #
				H.P.	R.P.M.	Oper's Amps	Timer Purch for Coll. #	R.P.M.	C.F.M.	Design Inlet Static	Style		H.P.	R.P.M.							
1	5FC7 Balcony	Strip Finishing	16N	60	1200	75	18	1042	16,000	6.15		2L6-CDQ	5	1200	-11B		W405 Sh 2A3	'70	'61	1	
	5JK6 2nd	"	"	60	1200	70		1042	16,000	6.34		B-6-6	5	950	-11C		W405 Sh 2	'70	'60	2	
3	6JK7 2nd	"	"	50	1800	66		1039	15,000	5.0	1	2L6-CDQ	5	1800	-11D		W405 Sh 3	'70	'55	3	
4	8JK9 2nd	Wet Compounding	"	50	1800	60		1015	15,000	3.5		B-6-6	3	1800	-11		W214 Sh 1	'55	"	4	
5	8JK9 2nd	(Idle)	20W	40	1200			1430	9,200	5.4		Gravity			-11		W219 Sh 2	'55	'55	5	
6	8JK9 2nd	Dry Compounding	16N	50	1200	65		1074	15,000	6.0		B-6-6	5	950	-11			'55	'55	6	
7	10QR11 Balcony	Block Compounding	16N	60	1200	65	8	1160	15,940	5.2		K	2	1200	-11	W228 Sh 6	W405 Sh 19	'55	'60	7	
8	10QR11 Balcony	Block Preforming	16N	60	1200	65	8	1008	16,500	3.6	4	B-6-6	5	1200	-11F	"	W405 Sh 13	'67	'55	8	
9	6ZZA7	Block Finishing	16N	50	1750	63	17	1060	16,000	7.2	5	Gravity			-11E	W228 Sh 3	W405 Sh 14	'67	'64	9	
	16XY17	A.B.K.	20N	75	1750	90		1121	22,000	6.17	8	Drag Out			-11A	W228 Sh 4	W405 Sh 16	'67	'66	10	
12	13PQ14 2nd	Pilot Plant	12W	10	1160	12		2150	3,000	4.1		Gravity			-9		W266 Sh 7	'55	'55	12	
13	13HJ14	Coal Grinding	6N	15	1725	14		1480	5,500	6.0		2L6-CDQ	5	1800	-10			'59	'59	13	
14	12ADA18	Blanket Preforming	16N	50	1750	65	16	1042	16,000	4.86	7	2L6-CDQ	5	1200	-14	W228 Sh 3	W405 Sh 7	'67	'63	14	
15	7ZZA8	Block Finishing	16N	50	865	52	17	1039	16,000	3.88	9	Gravity			-15	"	W405 Sh 14	'67	'63	15	
16	6ZZA7	Block Finishing	20N	60	1750	68	17	1071	20,000	5.84	16	Gravity			-16	"	"	'67	'66	16	
17	7ZZA6	Block Finishing	20N	60	1750	58	17	1073	20,300	5.04	6	Gravity			-16A	W228 Sh 5	"	'67	'66	17	
18	6CD7 Balcony	Strip Finishing	20N	60	1800		18	1073	20,300	6.42	17	2L6-CDQ	5	1200	-16B	"	W405 Sh 2	'70	'70	18	
19	12ADA18	Blanket Preforming	16N	50	1800	55	16	1042	16,000	5.42	10	2L6-CDQ	5	1200	-16C	"	W405 Sh 7	'67	'66	19	

TABLE III (continued)

<i>Collector #</i>	<i>Location</i>	<i>Type</i>	<i>Motor H.P.</i>	<i>Fan C.F.M.</i>	<i>Design Inlet Static</i>
20	New Addition	16 N	50	16,000	4.69
21	Metallic Sintering Building	4 N		4,000	2.50
22	New Addition	20 N	60	20,000	4 - 6

Total Designed Exhaust Volume - 314,740 cfm

TABLE IV

RESULTS OF VENTILATION SURVEY

Machine	Machine Code	Hood Type	Volume CFM	Duct Diameter	Vented to Collector #
Multiple Drill #4	MD- 4	Underneath	315	5"	2
Multiple Drill #5	MD- 5	Underneath	438	5"	2
Multiple Drill #6	MD- 6	Underneath	411	5"	2
Drill Press #5	DP- 5	At Drill	151	4"	18
Drill Press #8	DP- 8	At Drill	151	4"	18
Surface Grinder #4	SG- 4	Wheel Underneath	223 751	4" 6"	18
Edge Grinder #1	EG- 1	Underneath	771	6"	18
Surface Grinder #5	SG- 5	At Wheel & Underneath	680	7"	18
Surface Grinder #6	SG- 6	At Wheel & Underneath	---	7"	18
Lining Ripper #1	R - 1	Underneath	813	5"	2
Cut-Off Saw #1	S - 1	Blade & Underneath	1297	5"	3
Cut-Off Saw #3	S - 3	Blade & Underneath	522	5"	3
Cut-Off Saw #4	S - 4	Blade & Underneath	1269	5"	3
Preform Station #1	PF- 1				
Weigh Station		Slot	166	1 " x 15"	
Overhead		Grate	416	10" x 15"	19
Preform Station #20	PF-20				
Weigh Station		Slot	250	1 " x 15"	
Overhead		Grate	700	10" x 15"	19

Wetland--BZ

10	0.4	11	0	0
200	0.7	202	6.6	2.5

Personal

1	0.7	0.7	0.3
3	1.1	1.4	0.6
8	0.2	0.6	0.2
207	3.0	2.5	1.4

Auto Poller Oper.--BZ

13	0.3	41	11.0	0.0
145	0.3			

Personal

22	1.5	1.2	0.6
25	1.3	1.0	0.5
26	0.5	0.4	0.2
27	2.9	2.4	0.8
28	0.7	0.6	0.6

NOTES ON ALTERNATIVES

"Personal" refers to personal samples on membrane filters
 "Auto Poller" refers to sampling done by computer sampler & membrane filter
 "Wetland" refers to unattended samples taken by a wetland sampler
 "Wetland" refers to sampling of General plant and in the wetland department

TABLE V

American Dental Glass Company
 Results of Air Samples of September, 1965
 Winchester, Virginia
 Division

Operation	Impinger		Membrane Filter	
	Sample #	mpcf	Sample #	Total mpcf
Grinding & Coating	116	0.7		
	107	0.2	108	0
	202	0.2	203	0
	129	0.3	130	1.9
Compounder				
Personnel				
	2			0.6 0.5 0.1
	27			9.2 7.0 3.1
	30			0.6 0.5 0.2
	205			1.6 1.2 0.5
	206			0.3 0.2 0.1
	209			0.2 0.1 0.1

>5u

American Brake Shoe Company

Operation	Impinger		Membrane Filter		
	Sample #	mppcf	Sample #	Total	10 µ + >5µ
Mixing & Coating - Continued					
Auto Roller Oper. -- Personal (Cont'd.)			158	0.1	0.3 0.0
			159	0	0.0 0
			210	25.0	0.9 0.1
			211	8.9	1.6 0.4
			212	2.4	0.5 0.0
Hand Roller--Personal			213	3.7	0.5 0.1
			214	35.8	1.1 0.1
Sweeper--Personal			19	0.6	0.6 0.2
Service Man--Personal			20	0.7	0.6 0.4
Quality Control--Personal			21	1.3	1.0 0.3
Preform--Personal			7	1.4	1.0 0.6
Forming					
Hand Roll Operator--BZ	139	0.4	140	2.5	0.6
Radius Roll--BZ	353	0.4	354	12.9	3.3
	291	0.6	292	3.1	0.4
Personal			293	2.7	2.0 1.0
			297	4.2	1.4 0.7
			248	1.5	0.5 0.3
Preform Operator--BZ	51	1.3	52	3.1	1.0
	137	1.2	138	7.6	1.6

American Brake Shoe Company

Operation	Indicator		Membrane Filter		
	Sample #	mppcf	Sample #	Total	10 μ +
>5 μ					
Forming (Continued)					
Preform Operator--EZ (Cont'd.)	147	1.9	148	11.5	4.5
	162	0.4	163	0	0
	176	3.9	177	3.6	1.0
Personal			142	16.9	9.6 3.9
			144	7.7	5.4 3.2
			145	4.8	3.5 2.5
			146	4.8	3.1 1.6
			152	8.4	7.0 2.9
			153	6.3	5.5 3.0
			155	7.1	6.1 2.7
			157	1.5	1.7 1.0
			160	10.8	9.5 4.6
			161	7.5	6.3 2.9
Hand Roll Operator--EZ	139	0.4	140	2.5	0.6
Radius Roll--EZ	353	0.4	354	12.9	3.3
	291	0.6	292	3.1	0.6
Personal			293	2.7	2.0 1.9
			297	4.2	1.4 0.7
			343	1.5	0.5 0.3
Preform Operator--EZ	51	1.3	52	3.1	1.0
	137	1.2	138	7.6	1.6
	147	1.9	148	11.5	4.5
	162	0.4	163	0	0
	176	3.9	177	3.6	1.0

American Brake Shoe Company

Operation	Impinger		Mercuric Filtrate		
	Sample #	mpcf	Sample #	Total	10 μ *
					>5 μ
Forming (Continued)					
Preform Operator--Personal			142	16.9	9.6 3.9
			144	7.7	5.4 3.2
			145	4.8	3.5 2.5
			146	4.8	3.1 2.3
			153	8.4	7.0 2.9
			154	6.3	5.5 3.0
			155	7.1	6.1 2.7
			157	1.5	1.7 1.0
			160	10.8	9.5 4.6
			161	7.5	6.3 2.9
Hot Pressing					
Sweeper--Personal			60	0	0.1 0.0
Serviceman--Personal			69	2.6	1.0 0.7
			180	2.8	1.0
Cinching Forms--Personal (Form Fitter)					
			402	1.4	1.2 0.7
ANK & Press Oper.--BZ	84	0.1	83	0	0
Book Press Oper.--BZ (Hot).	185	1.1	186	1.6	0.9
Personal			181	5.3	4.0 1.5
Service Man, Hot Press			141	2.7	1.4 0.6
			143	3.9	1.4 0.5

American Brake Shoe Company

Operation	Impinger		Membrane Filter		
	Sample #	µppcf	Sample #	Total	10 µ +
					>5µ
Hot Pressing (Continued)					
Hot Press Oper.--BE	63	1.0	Ch	0	0
	73	0.1	74	0.6	0.4
Personal			58	1.8	1.5 1.8
			59	3.4	2.5 0.7
			61	2.5	1.8 0.5
			62	0	0.1 0.0
			65	7.9	5.0 2.0
			66	2.9	2.1 0.9
			68	1.4	1.3 0.3
			70	2.6	2.2 0.9
			71	1.6	0.7 0.3
			72	3.3	1.6 1.2
			79	4.4	3.8 1.6
			80	4.3	3.6 2.2
			81	1.3	1.4 0.6
			82	0.2	0.1 0
			183	3.1	2.2 0.8
Baking					
Oven Oper.--BE	221	0.4	220	0.4	0.0
Conveyor					
Personal			193	1.4	1.2 0.6
Oven Oper.--Personal			194	1.9	1.4 0.5
			403	5.4	3.1 1.2
			414	0.5	0.3 0.1

American Brake Shoe Company

Operation	Treadings		Performance Milling		
	Sample #	Depth	Sample #	Total	10 p.p.
>5p					
Grinding & Grinding					
Radius Roll--34	215	0.5	227	0.0	0
			244	3.5	1.4
Rack Grinder--31	241	0.3	262	1.3	0.2
			303	0.2	4.3
Strip Grinder--33	312	0.3	303	1.6	0.2
Auto Grinder--35	401	1.2	402	5.5	1.4
Stock Grinder--37	310	0.6	340	2.1	0.0
Double High Speed Grinder -- 38	409	1.7	490	0.6	0.2
Rough Grind--38	611	1.2	610	1.6	0.2
Radius Grind--38	612	1.9	613	3.9	0.3
Split Grinder	703	3.7	706	9.0	3.4
Auto Grinder DP Block	705	0.8	706	5.0	1.9
Coil Grinder--38	351	0.4	352	3.1	0.0
Personal			258	1.3	0.9 0.7
Strip Finish--Personal			299	6.2	3.5 1.3
Turner Oper.--Personal			324	12.9	3.5 2.1
			336	3.0	1.0 0.3

American Brake Shoe Company

Operation	Impinger		Membrane Filter		
	Sample #	ppcf	Sample #	Total	10 µ F
					>5µ
Grinding & Sanding (Continued)					
Coil Grinder		296		3.7	2.5 1.2
Double Disk Grinder--Personal		354		5.4	3.7 2.5
Sweeper--Personal		409		5.0	4.2 2.3
Auto Burr. Mach.--Personal		393		19.7	15.2 7.3
Printer--Personal		242		7.6	5.3 2.7
		267		23.1	2.9 0.5
		335		3.0	1.2 0.8
Back Grinder--Personal		249		7.9	3.6 1.4
		254		0.7	0.5 0.2
		255		2.3	0.6 0.2
		298		1.2	0.5 0.5
		338		4.4	2.7 2.2
		345		18.5	4.9 2.0
Finish Grind Block--Personal		497		0.9	6.6 2.3
		498		7.8	6.1 2.5
Strip Grind.--Personal		256		15.6	1.5 0.9
		257		0	0.0 0
		264		7.4	5.5 2.5
Chamfer. Oper.--Personal		243		1.7	0.7 0.3
		247		0.1	0.0 0.1
		261		11.3	2.5 1.2
		391		4.1	3.1 1.4
		270		5.6	1.2 0.8
		346		13.9	3.1 1.3

American Brake Shoe Company

Operation	Laminar		Membrane Filter		
	Sample #	mpcf	Sample #	Total	10 μ +
					>5 μ
Cutting & Drilling (Continued)					
Drill Oper.--Personal (Cont'd.)					
			251	0.0	0.0 0
			262	1.5	0.9 0.4
			259	1.4	0.1 0
			260	48.4	1.7 0.2
			265	6.1	1.1 0.4
			269	4.4	2.0 1.1
			277	0.5	0.2 0.0
			280	3.1	2.2 1.5
			282	2.5	0.6 0.6
			376	13.0	10.2 3.1
			397	3.5	2.2 0.8
			700	6.7	4.9 1.7
Tafflon -- Personal Lathe Oper.					
			197	0.9	0.7 0.3
			198	2.1	1.4 0.6
Ball Joint Punch					
			385	3.2	2.1 0.7
			67	1.0	0.8 0.3
Cutter					
			401	3.7	2.6 0.7
Pexco Press					
			376	1.9	1.1 0.6
AIR Oven					
			199	3.5	1.2 0.6
Inspection & Packing					
Grouping--DE	368	0.3	369	4.7	1.0

American Brake Shoe Company

Operation	Impinger		Nephelometer Filter		
	Sample #	mpcf	Sample #	Total	10 µ + >5µ
Inspection & Packing (Continued)					
Box Segments --Personal					
Printer, Loader			377	1.6	1.0 0.5
			378	1.7	1.2 0.7
			380	1.4	1.2 0.6
Packer--Personal			382	1.8	0.9 0.3
			383	0.9	0.7 0.5
			386	1.8	1.4 0.5
			371	4.2	3.1 1.2
			372	2.6	2.1 0.9
			363	2.6	2.1 0.7
Inspection Dry -- RI	459	0.6	460	1.2	0.2
	474	0.7	475	0.0	0.0
Personal			278	2.6	0.5
			308	19.1	14.3 5.8
			341	8.2	6.4 2.3
			347	7.1	5.1 2.1
			355	4.2	3.2 1.1
			370	5.3	4.0 1.3
			379	9.9	7.8 3.4
Net--32	366	0.3	367	0.6	0.0
	445	0.1	446	0	0.0
	467	0.2	468	1.6	0.0
Personal			439	1.9	1.3 0.6
			443	1.4	1.2 0.7
			444	1.1	1.0 0.5
			449	7.5	5.7 2.5
			451	3.1	2.2 0.6

American Brake Shoe Company

Operation	Insurer		Maximum Filter		
	Sample #	mppt	Sample #	Total	10 p. +
					>5u
Inspection & Packing (Continued)					
Mot--Personal (Cont'd.)		452		5.0	3.3 1.3
		453		3.1	1.7 0.8
		461		5.4	1.7
		462		0.7	0.6 0.3
		464		4.3	3.5 1.3
Leader--Personal		442		1.7	0.6
Miscellaneous					
Shipping Checker--Personal		379		0	0 0
Wire Sitter--Personal		204		2.7	1.0 0.8
Printer--Personal		500		2.1	1.0 0.6
PC Room--Personal		411		2.9	2.4 1.3
Electrician--Personal		405		1.4	1.3 0.8
		406		1.4	1.2 0.4
		410		1.0	0.9 0.4
Maint. Crew--Personal		400		0.6	0.4 0.1
		404		3.3	1.5 1.1
		412		1.7	0.9 0.5
		413		1.8	1.2 0.4