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FIBROUS GLASS DUST

AND

INDUSTRIAL HYGIENE SURVEY

PITTSBURGH PLATE GLASS INDUSTRIES
Shelbyville, Indiana

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16. Abstract (Limit: 200 words)

Worker exposures to glass fiber dust, silica (7631869) dust, phenol (108972) vapor, formaldehyde (50000) vapor, n-hexane (110543), acetone (67641) and noise were surveyed at the Pittsburgh Plate Glass Industries (SIC-3211) in Shelbyville, Indiana on August 28 and September 1, 1972. About 600 persons were employed in the factory which operated three shifts. A physician was retained as a consultant. A nurse was on duty 24 hours a day in the factory dispensary. Pre-employment examinations were given. An industrial hygiene and environmental consultant was employed at the facility. Safety glasses and respiratory protection devices were provided. Quartz particles varied from 10 to 15 micrometers in diameter. Personal silica samples ranged from 0.34 to 5.15 milligrams per cubic meter (mg/cu m). Area samples of silica ranged from 0.12 to 5.33mg/cu m. Total airborne phenolic compound concentrations ranged from 0.16 to 0.24 parts per million (ppm). Particulate free phenol concentrations ranged from 0.1 to 1.0 mg/cu m. Formaldehyde concentrations ranged from 0.01 to 0.08 ppm. Acetone and n-hexane concentrations ranged from 14 to 58ppm and 61 to 181ppm, respectively. Noise exposures ranged from 72 to 117, 73 to 119 and 76 to 119 decibels on the A, B and C weighing network, respective All silica samples were below the current standard but the size of quartz particles was greater than the respirable size. Acetone and n-hexane samples did not exceed the present standards of 1000 and 500ppm, respectively. Formaldehyde and phenol standards were 2 and 5ppm, respectively. The authors recommend exhaust ventilation improvements and the use of respiratory protection equipment and hearing protection devices in specified areas. Carbon-dioxide emissio of lift trucks should be measured, and medical surveillance tests should be given to exposed →

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(See ANSI-Z39.18) See Instructions on Reverse OPTIONAL FORM 272 (4-77) (Formerly NTIS-35) Department of Commerce employees on a regular basis and pre-employment X-ray tests should be given to all employees.

PLACE VISITED	:	Pittsburgh Plate Glass Industries Fiber Glass Division Shelbyville, Indiana
DATES OF TRIP	:	August 28 - September 1, 1972
PERSONS MAKING TRIP	:	David Bayliss John M. Dement Harold J. Mangin William Parnes, M.D. Ralph D. Zumwalde
PERSONS CONTACTED	:	Dr. Lee Grant, Corporate Medical Director Mr. Herbert H. Thompson, Plant Manager Mr. Robert G. Bowen, Process and Quality Control Supervisor Mr. Charles Heaton, Safety Director Mr. Werner K. Keekhut, Chemist Dr. Clairance H. Heilbing, Field Quality Engine Mr. David Edmonds, Supervisor of Technical Services Mr. George Warshel, Production Supervisor Mr. Jim Lindy, Personnel Director Mr. Jack McDaniels, Union Vice President Mr. Carl Jeffries, Union Safety Committee Representative Mr. C. Edmonds, Plant Engineer
PURPOSE OF TRIP	:	To make a complete industrial hygiene survey including an evaluation of fibrous glass dust and other potential worker exposures.

Introduction

During the week of August 28 - September 1, 1972, a fibrous glass dust and industrial hygiene survey were conducted at the Pittsburgh Plate Glass Industries, Shelbyville, Indiana facility. David Bayliss, John Dement, Bud Mangin, Dr. William Parnes, and Ralph Zumwalde attended the initial meeting and made a plant tour and John Dement, Bud Mangin, and Ralph Zumwalde remained to continue the survey.

During the week approximately 140 air samples were collected in the various process areas. These samples were used to evaluate fibrous glass exposures, free silica exposures, phenol exposures, formaldehyde exposures, and exposure to solvents. A noise survey was also conducted. The following paragraphs describe the Shelbyville facility and the sample methods which were used along with sample results and recommendations for improvements.

Description of the Plant

The Shelbyville plant is one of three fibrous glass plants owned by Pittsburgh Plate Glass Industries and is the only facility manufacturing wool insulation. The other two plants are located in Lexington, North Carolina and Shelby, North Carolina. Both of these plants manufacture fibrous glass textiles (yarns and rovings).

There are presently approximately 600 persons employed in Shelbyville. About 500 of these people are blue collar workers. Most areas of the plant operate on a three shift basis.

The plant began operation in 1952 as an insulation manufacturer. The scope of the products has broadened over the years and the present major product lines are as follows:

1. House and Mobile Home Insulation
2. Aluminum Lined Air Ducts
3. Molded Pipe Insulation
4. Flexible Air Ducts
5. Neoprene Coated Bats

Medical Programs

The plant is serviced by a physician, Dr. Dalton, who is available on a consultation basis for acute problems and who performs physical examinations. There is on the premises a dispensary which is open and staffed by a nurse 24 hours daily and which is primarily engaged in the treatment of minor trauma. Among the facilities is an audiometric booth.

Pre-employment examinations include a self-administered history form (see Attachment I), a physical examination, an audiogram, a urinalysis including albumein glucose and microscopic examination, and spinal x-rays. To the knowledge of the people questioned, there is no pre-employment chest x-ray, nor is pulmonary function testing carried out. Following pre-employment physicals, employees in the batch house are required to have repeat chest x-ray examination at two year intervals (formerly six month intervals but changed after management environmental studies). There is apparently no other regular schedule of physical or medical laboratory examination.

Those present knew of no significant incidence of pulmonary disease among employees. The only medical complication known to involve employees was a low incidence of skin irritation and sensitization to phenol-formaldehyde binder (1-2 cases in 8 months).

Plant Industrial Hygiene and Safety Programs

The plant does not presently employ an industrial hygienist nor is there a corporate industrial hygienist. Dr. Fraiser of the University of North Carolina is retained as both an industrial hygiene and environmental consultant. Dr. Fraiser has made impinger dust counts throughout the plant along with a noise survey.

Mr. Charles Heaton serves as full time Safety Director for this plant. The safety program is handled through a Union-Management safety committee which meets monthly. The union in the plant is the National Glass Bottle Blowers, and Mr. Jack McDaniels serves as the union Vice-President. Mr. Carl Jeffries serves as the union representative on the safety committee.

Safety glasses with side shields are presently required in all production areas. Respiratory protection is provided in some areas of the plant. Safety shoes are not required; however, the plant does have a program to aid in their purchase.

Description of the Processes

Fibrous glass is formed at Shelbyville by either centrifugal forming or flame-jet forming. Schematic diagrams of these two processes are shown in Figure 2 of the Appendix. Flame jet forming is designated as "Superfine" by the company and centrifugal forming designated "Rotary". There are five superfine lines in this plant and one rotary line.

Glass charges for both types of furnaces are mixed in a batch house. Boro-silicate glass is made and the raw materials include sand (50%), soda ash (14%), B_2O_3(12%), nephaline syanite (12%), flurospar, rutile, and clay. Rutile is being phased out due to its high cost. A complete raw material list is given in Table 1 of the Appendix.

Both hand and automatic mixing are used. The major raw materials (sand, etc.) are pneumatically conveyed from storage silos outside the building to the mixer. The minor ingredients are weighed and hand dumped into a mix station where a bucket elevator carries the materials to the mixer. After the raw materials are completely mixed they are either emptied into batch cans for the superfine furnaces or pneumatically conveyed to the rotary furnace.

In the flame jet forming process, glass batch is fed into the furnace where boro-silicate glass is formed at temperatures of approximately 2500°F. After the glass is formed, it is fed into a refractory container known as a forehearth were the glass is held at approximately 2250°F. The glass next flows through platinum bushings in the bottom of the forehearth to form primary fibers of rather large diameter. Upon leaving the forehearth the primary fibers are fed into high velocity gas flame blowers which further attenuate the fibers into desired diameters by a pulling action.

As the attenuated fibers move away from the blowers, a phenol-formaldehyde binder is applied by a spraying process. The fibers, which are coated with the uncured binder, are collected on a conveyor, thus forming a continuous blanket.

After the glass fiber blanket leaves the forming area, the binder may be cured or left uncured. Blankets used as home insulation are cured in an oven at temperatures between 400 and 500°F. Blankets used to make molded pipe insulation are left uncured. Home insulation is either cut into bats or rolled onto a cardboard tube following curing.

Uncured blankets are rolled and taken to the pipe insulation area for further processing.

The only major difference between centrifugal forming and flame jet forming is the method used to form fibers. In the centrifugal forming process, glass from the forehearth is fed into spinners where centrifugal force is used to force the glass through small holes in the periphery of the spinner thus forming fibers. Upon leaving the spinners, each glass fiber is met by a high velocity air stream which further attenuates the fibers. A phenol-formaldehyde binder is also added at this time. The centrifugal forming process at Shelbyville uses three spinners with a total of 90,000 cfm being drawn through the forming hood. The operations which follow forming are the same as previously mentioned for the superfine process.

Molded pipe insulation is made from superfine mats coated with uncured phenol-formaldehyde binder. The mats are cut to length and rolled onto a steel mandrel and then clamped between two forming halves. The assembly is then cured in an oven at 500°F. Following curing, the mandrel is removed, the ends are trimmed, and the insulation cut into halves. Finally a vapor binder is applied to the outer surface and the material packed for shipment.

Flexible fibrous glass air ducts are constructed from mats made in the rotary process. In this process, the glass mat is wound around a steel wire cage and the ends glued together. A polyethylene covering is next slide over the duct. These ducts are next inspected and packaged for shipment. The glue used in this process uses acetone and *n* hexane as solvents.

The final process to be discussed is the manufacture of "textrafine" insulation mats. This process is mainly one of "scrap recovery" although the resulting product is higher in cost than other insulation blankets.

In the textrafine process, textile scraps are received from PPG's two North Carolina plants and scraps from this facility are shredded, dried, and baled. These bales are next fed into breakers and blenders similar to those used in textile mills. From the blender, the fibers enter a carding section where the fibers are combed into parallel position to form a tenuous web. High velocity air is next used to blow a powdered phenolic resin onto the fibers. The fibers, impregnated with resin, are next collected on a conveyor to form a mat and cured in a curing oven. Following curing, the mats are cut and packed for shipment.

Inspection of the Plant

Potential Health Hazards

The following are potential health hazards which were noted during the survey:

1. Fibrous Glass Exposure (Skin & Respiratory)
2. Silica Dust Exposure in the Batch House
3. Exposure to Phenol Vapor
4. Exposure to Formaldehyde Vapor
5. Exposure to Powdered Phenolic Resin in Textrafine Operation
6. Skin Contact with Uncured Phenol-Formaldehyde Binder
7. Exposure to *n* Hexane and Acetone Solvents in Glass Flex and Molded Pipe Finsihing
8. High Noise Exposure in Selected Areas
9. Heat Stress in Furnace Areas
10. Possible Exposure to Carbon Monoxide from Gasoline Powered Lift Trucks

Housekeeping

Housekeeping in this plant varies from excellent in some areas to very poor in others. Probably the area where housekeeping is best is glass batch. In this area, the floor is kept clean by sweeping with oiled sawdust 2-3 times weekly. This procedure appears quite effective in preventing redispersal of settled dust.

The area where housekeeping is most lacking is textrafine. In this area considerable amounts of powdered phenolic resin may be found on the floor. Compressed air is also used for cleaning in this area.

Sweeping is done throughout the plant with brooms and vacuum sweepers. Isles are generally clear and all machines appear well guarded. Compressed air hoses are being fitted with pressure reducers. High noise areas and no smoking areas are clearly marked.

It was noted that all but two service trucks in this plant were gasoline powered. The other two trucks were electric powered. Gasoline powered vehicles are always a source of carbon monoxide, and may emit gross quantities of carbon monoxide if not serviced properly.

Ventilation

Ventilation in the glass batch house consists of local exhaust at all material transfer points and at the bag dump station. These ventilation points are vented to a bag collector located in the room. Collection velocities at the front of the filling hood were found to range between 30 and 60 fpm. The design capacity for the bag collector is approximately 20,000 cfm.

The main point of ventilation for the superfine lines is the forming station. According to Mr. Edmonds, the plant engineer, the combined air volume for the five forming stations, the five glass furnaces, and, the four curing ovens is 850,000 cfm. An additional 250,000 cfm is pulled through the roof over the glass furnaces for cooling purposes. About 10,000 scfm is pulled through each curing oven with exit temperatures of approximately 250°F. No collector system is provided for capturing the phenol and formaldehyde exiting from the oven stacks. Saws used in the superfine operations have no local exhaust ventilation.

The major exhaust point for the rotary process is again the forming station. Approximately 90,000 cfm is pulled through the forming station and vented to three wet scrubbers at 30,000 cfm each. Natural draft is provided over the furnace for heat dissipation making a total air volume of approximately 127,000 cfm. Saws for the rotary materials are provided with local exhaust and vented to a low value cyclone collector. Again, the curing oven for this line is not provided with a collector.

In the textrafine area, the major point of ventilation is also the forming station. Each forming station is vented to a bag collector located on the roof. The fiber "fly" from the card machines is feed back into the blender which is in turn vented to an inplant bag collector with the air being recycled.

In the molded pipe area, two collector systems are used in connection with the finishing saws. Both of these systems consist of a settling chamber followed by a bag collector. Air recirculation takes place. Collection velocities at the band saws ranged between

800 and 1500 fpm. It was noted that one sawing line had no local exhaust ventilation.

Ventilation is provided in the flexible duct operation for the purpose of solvent vapor control. The six forming stations are provided with hoods located near the floor. A total of 35,000 cfm is drawn through these hoods.

Sampling Procedures

Samples were collected in this plant for evaluating exposures to fibrous glass dust, silica dust, phenol vapor and particulate, formaldehyde vapor, and solvents (*n* hexane and acetone). The following paragraphs describe the air sample collection and evaluation methods used.

Airborne fibrous glass samples were collected for evaluation by fiber count and total weight. Personal samples for fiber count were collected on Millipore Type AA cellulose ester membrane filters at a calibrated collection rate of 2.0 liters per minute. Fibers less than 10 microns in diameter (respirable) were counted at 430X magnification by the phase contrast method recommended by NIOSH for asbestos.[1] Size distributions for airborne fibers in each of the operations were made using a calibrated "Porton" reticle and a "Leitz" rotating stage phase contrast microscope at 210X magnification.

Personal samples for total dust weight were collected on MSA polyvinyl chloride membrane filters at a calibrated flow rate of 2.0 liters per minute. The samples were tared and re-weighed on the 20 milligram "A" scale of a Cahn Gram Electrobalance. Total dust concentrations are reported in milligrams per cubic of air.

Personal and general air samples for evaluation of silica dust exposures were collected in the glass batch area. Both personal total and personal respirable samples were collected on MSA polyvinyl chloride membrane filters. Total dust samples were collected at a calibrated flow of 2.0 liters per minute and respirable samples were collected using a 10mm nylon cyclone[2] at 1.7 liters per minute. Respirable sample pumps were fitted with pulsation dampeners as described by LaViolette and Reist.[3]

Total and respirable mass general air samples were collected in selected areas of the glass batch house. Total mass samples were collected on 37mm "Flotranics" silver membrane filters at 7.4 liters per minute air flow. Respirable mass samples were collected using a horizontal elutriator pre-sampler meeting the Walton[4] design criteria and a 37mm MSA polyvinyl chloride filter at a calibrated flow of 10 liters per minute. Constant flow was maintained in both samples by use of a mass critical region orifice.

In addition to air samples for silica determination, two settled dust samples were collected for particle size analysis and free silica evaluation. Figure 7 of the Appendix shows general air and settled dust sample locations in the batch area.

Glass batch samples for free silica were analyzed in two ways. All samples collected on polyvinyl chloride filters (personal and general air) were analyzed using the colorimetric method of Talvitie.[5] General air samples collected on silver membrane filters were analyzed using x-ray diffraction.[6] Both x-ray diffraction and the Talvitie method were used to analyze the settled dust samples.

In addition to analyzing the settled dust samples for percentage free silica, a microscopic particle size analysis was performed. Using the phase contrast dispersion staining method described by Crossman,[7 8 9] quartz particles were identified and sized. A particle size distribution for the other dusts present was also determined.

Airborne formaldehyde samples were collected by drawing one liter of air per minute through a two stage absorber. Each absorber was equipped with an extra coarse fritted tube inlet and filled with 20 ml of distilled water. With two absorbers in series, the total collection efficiency for formaldehyde is approximately 95%.[10] Laboratory analysis for formaldehyde was performed using the chromotropic acid colorimetric method.[10 11]

Samples were collected for determining both vapor and particulate phenol concentrations throughout the plant. Samples for total phenols were taken in all plant areas except textrafine where considerable amounts of powdered phenolic resin were anticipated. Total samples for phenolic compounds were collected by scrubbing in a 1N solution of sodium hydroxide. The scrubbing apparatus used was a fritted absorber of extra course porosity filled with 20 ml of 1N NaO. The air collection rate was one liter per minute maintained by using a mass critical regain orifice.

General area samples for particulate phenolic compounds were taken in the textrafine operation. These samples were taken in the same manner mentioned above except that a fibrous glass filter was used as a pre-sampler. Particulates were captured on this filter allowing vapor phenolics to be captured in the scrubbing train. Each fibrous glass filter was pre-extracted with benzene prior to use.

Personal samples for particulate phenolic compounds were also collected in the textrafine area. Fibrous glass filters pre-extracted with benzene were used at a flow rate of 2.0 liters per minute.

Laboratory analysis for phenols was performed by distillation from an acidified system and coupling with 4-aminoantipyrine in an alkaline medium containing an oxidant.[12] A microscopic size analysis of airborne powdered phenolic resin in the "textrafine" area was also determined.

Samples for airborne solvents were collected in the Glassflex area (acetone and *n* Hexane) and the molded pipe insulation finishing area (acetone). These samples were collected by passing the vapors through activated charcoal at a sample rate of one liter per minute. All samples were 10 minutes in duration.

Laboratory analysis of the absorbed organic solvents was performed by desorption with carbon disulfide and introduced into a gas chromatograph equipped with a flame ionization detector. Concentrations were computed by comparing the resulting curves with standard curves for the solvents.[13]

In addition to air sampling in this plant, noise level measurements were made in most areas. At each point, three readings were taken to provide some indication of the frequency distribution of the noise. A General Radio Type 1565-A sound level meter calibrated with a Type 1562-A calibrator was used for all measurements. The meter response was set on the slow position and measurements made on the "A", "B", and "C" weighing networks.[14]

Results and Discussion

Although no meaningful standard for fibrous glass exposure has yet been established, levels found in this plant would appear to be low based on both fiber counts and total dust concentrations (Table 2). The highest fiber concentrations were found in the scrap reclamation area. Higher fiber concentrations were also found in the molded pipe insulation area (samples M-52 and M-53) near the line which has no local exhaust ventilation.

Low airborne fiber levels can best be explained when fiber sizes are considered. Airborne fiber size distributions (length and diameter) for each of the operations are given in Figures 8-12 of the Appendix. From Table 8 the smallest median airborne fiber diameter was 2.1 micrometers in the molded pipe insulation area and the smallest median length was 37 micrometers found in the rotary area. Based on these large sizes, one would expect that most fibers would settle rapidly and therefore not be airborne for any appreciable length of time.

Samples results for airborne free silica in the glass batch area are shown in Table 3 of the Appendix. Figure 15 shows a graphical comparison between sample results and the present federal standards for free silica exposure. All samples were below the present standards indicating rather good controls in this area. A particle size analysis of batch house settled dust (Figure 14) shows that the median diameter for quartz particles is 15 micrometers and that approximately 80% of all quartz particles are larger than 10 micrometers and would therefore not be respirable.

Samples for acetone and *n* hexane exposures in the glassflex and molded pipe finishing areas are shown in Table 7. None of these samples approached the present standards of 1000 and 500 ppm for acetone and *n* hexane respectively.

Area samples for formaldehyde and phenolic compound exposures are shown in Tables 5 & 6. The highest formaldehyde concentration was found at the curing oven in the molded pipe insulation area and was only 0.08ppm. The highest phenolic compound concentration was 0.24 ppm in the rotary forming area. Present standards for formaldehyde and phenol are 2 and 5 ppm respectively. It must be noted; however, that there is potential for skin contact with both phenol and formaldehyde when handling mats with uncured binder (superfine and molded pipe insulation). Our laboratory was unable to determine the quantity of uncombined phenol in a resin bulk sample.

Machine operator's exposures to powdered phenolic resins in the textrafine area are grossly excessive. Samples P-23, P-24, and P-25 of Table 2 show peak concentrations in excess of 41 mg/m^3 with an average (3 samples) of 23.7 mg/m^3. Figure 13 shows a particle size analysis of the airborne phenolic resin. The median particle diameter is 2.0 micrometers and 90% of all the particles are less than 10 micrometers in diameter; therefore, large quantities of this material are of respirable size.

Table 5 shows particulate phenolic concentrations in the textrafine area. Comparing these results with samples P-23, P-24, and P-25, it appears that almost all phenolics in this area are in a polymerized state (phenolic resin).

From the noise survey, several high areas are noted. The most obvious areas are the glass forming stations where peaks of 117 dBA are noted (tests 6&7). High noise levels are also experienced in the textrafine area (test 18) and the molded pipe insulation area (test 24). Comparing the "A" and "C" scale measurements, it is noted that all "C" scale reading are higher indicating a prevalence of low frequency noises probably below 600 Hz.[14]

Conclusions and Recommendations

From the industrial hygiene survey and sample results, the following conclusions and recommendations for improvements are made:

1. Although all fibrous glass exposures appear low, the molded pipe line without local exhaust ventilation degrades the environment in this area (samples M-52 and M-53). Local exhaust should be added to the saws on this line without delay.

2. Free silica exposures in the glass batch area are well below the present standards; however, a leak was noted at the raw material mixer. This should be repaired without delay.

3. Curing ovens for the superfine and rotary process leak badly and emit dense smoke into the work areas. Ventilation improvements for these ovens are badly needed. One obvious improvement would be to increase the stack air flow and provide better hooding at the oven entrances.

4. Phenolic resin concentrations for machine operators in the textrafine area are grossly excessive and almost all the particles are of respirable size. Ventilation improvements are indicated for this area. Forming hoods should be better enclosed and local exhaust

ventilation provide at the resin hopper filling station. The pneumatic conveying system is also in need of repair as several leaks were noted. Machine operators should be required to wear respiratory protection when cleaning the forming hoods.

5. Although airborne phenolic compounds concentrations are low, potential exists for skin contacted with uncured binder containing free phenol. Our laboratory was unable to determine the free phenol content of the binder being used; however, it would be highly advisable for persons handling this binder to have urine or blood tests for phenol in order to ascertain the significance of this potential hazard.[15]

6. Noise levels in the glass forming areas, the textrafine area, the molded pipe area are excessive. Only workers in the glass forming areas presently wear hearing protection. Machine feeders and operators in the textrafine area and mandrel pullers in the pipe insulation area should be required to wear hearing protection.

7. Gasoline powered lift trucks are being used throughout the plant. These should be checked to be sure that their carbon monoxide emissions are acceptable.

8. Employees exposed to large quantities of respirable contaminents-e.g., employees exposed to phenolic resins in textrafine areas should be followed with yearly 14" x 17" chest x-rays and pulmonary function studies.

9. A 14" x 17" chest x-ray in the p-a projection should be a pre-employment requirement for all employees.

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APPENDIX

Tables

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2 Fibrous Glass and Total Dust Concentrations in All Production Areas
3 Glass Batch Silica Air Sample Results
4 Batch House Settled Dust Silica Results
5 Phenolic Compound Sample Results
6 Formaldehyde Sample Results
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8 Summary of Particle and Fiber Size Analysis by Optical Microscopy
9 Noise Survey Results

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2 Schematic of Centrifugal and Flame-Jet Forming Processes
3 Superfine Area
4 Rotary Area
5 Textrafine Area
6 Pipe Forming Area
7 Glass Batch Area
8 Superfine Fiber Size
9 Rotary Fiber Size
10 Textrafine Fiber Size
11 Molded Pipe Fiber Size
12 Glassflex Fiber Size
13 Textrafine Powdered Phenolic Resin Particle Size
14 Glass Batch Settled Dust Particle Size
15 Comparison of SiO_2 Samples With Present Standards

Attachments

I	Medical History and Physical Examination Record
II	Audiometric Examination Record

TABLE 1

RAW MATERIALS

FOR

PPG

Shelbyville, Indiana

I. GLASS BATCH

MATERIAL	*RECEIVED*
Soda Ash	Bulk & Bag
Sand	Bulk
Limestone	Bag
Rasorite	Bulk & Bag
Flourspar	Bag
Syenite	Bulk & Bag
Clay	Bag
Dolomite	Bag
Rutile	Bag
Sodium Sulfate	Bag

II. OTHER MATERIALS

MATERIAL	*RECEIVED*
Phenol-Formaldehyde Binder	Tank Car
Phenol Powdered Resin	Drum
Ammonia	Tank Truck
Aluminum	Rolls
Neoprene	Drum
Glassflex Adhesive	Drum

TABLE 2

FIBROUS GLASS AND TOTAL DUST CONCENTRATIONS

IN

ALL PRODUCTION AREAS

MILLIPORE SAMPLE #	*PVC SAMPLE #*	*OPERATION AND JOB*	*AIR VOLUME M^3*	*PVC DUST WT. Mg*	*FIBERS<10μ IN DIAMETER PER LITER*	*TOTAL DUST CONC. Mg/M^3*
		SUPERFINE				
M- 1	P- 1	Furnace Tender	0.75	0.29	20.4	0.39
M- 2	P- 2	Furnace Tender	0.77	1.09	23.7	1.41
M- 3	P- 3	Furnace Tender	0.78	0.17	41.6	0.21
M- 4	P- 4	Furnace Tender	0.74	0.19	30.8	0.25
M- 5	P- 5	Lead Operator	0.75	0.29	57.3	0.39
M- 6	P- 6	Selector Packer	0.72	0.49	42.4	0.68
M- 7	P- 7	Selector Packer	0.74	0.44	----[1]	0.59
M- 8	P- 8	Selector Packer	0.73	0.61	62.7	0.83
M- 9	P- 9	Selector Packer	0.72	0.44	42.3	0.61
		ROTARY				
M-18	P-18	Furnace Tender	0.71	0.24	64.7	0.33
M-13	P-13	Selector Packer	0.72	0.46	76.8	0.64
M-14	P-14	Selector Packer	0.73	0.94	53.7	1.29
M-15	P-15	Selector Packer	0.72	0.15	58.9	0.21
M-16	P-16	Selector Packer	0.72	0.60	134.9	0.83
M-17	P-17	Selector Packer	0.71	0.51	106.9	0.71
M-10	P-10	Facing Operator	0.73	0.54	45.9	0.74
M-11	P-11	Box Maker	0.72	0.36	38.1	0.50
M-12	P-12	Box Packer	0.72	1.70	55.4	2.36
		TEXTRAFINE				
M-27	P-27	Shredder and Bailer	0.68	0.46	26.6	0.67
M-26	P-26	Machine Feeder	0.68	2.61	36.3	3.84
M-32	None	Machine Feeder	----	----	67.7	----
M-25	P-25	Machine Feeder	0.68	9.54	----[2]	13.60
M-23	P-23	Machine Operator	0.69	9.30	----[2]	13.49
M-24	P-24	Machine Operator	0.68	28.33	----[2]	41.10
M-33	None	Machine Operator	----	----	----[2]	----
M-34	None	Machine Operator	----	----	25.5	----
M-19	P-19	Packer	0.71	0.61	33.9	0.86
M-20	P-20	Packer	0.80	0.69	44.0	1.16
M-21	P-21	Packer	0.69	1.12	22.0	1.62
M-22	P-22	Packer	0.69	0.46	80.7	0.66

MILLIPORE SAMPLE #	PVC SAMPLE #	OPERATION AND JOB	AIR VOLUME M^3	PVC DUST WT. Mg	FIBERS ≤10μ IN DIAMETER PER LITER	TOTAL DUST CONC. Mg/M^3
		MOLDED PIPE				
M-44	P-32	Forming Machine Operator	0.72	0.31	50.5	0.43
M-45	P-31	Forming Machine Operator	0.72	0.40	49.9	0.56
M-42	P-34	Forming Machine Operator	0.71	0.29	70.0	0.41
M-43	P-33	Mandrel Puller	0.71	0.09	51.3	0.09
M-46	P-30	Mandrel PUller	0.73	0.22	33.6	0.30
M-39	P-37	Oven Attendant	0.70	0.40	96.5	0.57
M-40	P-36	Oven Attendant	0.70	0.40	----[1]	0.57
M-41	P-35	Oven Attendant	0.70	0.28	69.4	0.40
M-48	P-28	Mandrel Cleaner	0.70	Void	69.0	Void
M-52	None	General Air	0.20	----	67.1	----
M-53	None	General Air	0.20	----	118.8	----
		MOLDED PIPE FACING				
M-49	P-94	Pipe Facer	0.48	0.17	56.5	0.35
M-50	P-93	Pipe Facer	0.48	0.13	43.8	0.27
M-51	P-92	Pipe Facer	0.52	0.13	69.4	0.25
M-47	P-29	Pipe Packer	0.73	0.22	12.5	0.30
		GLASSFLEX DUCT				
M-36	P-40	Duct Maker	0.65	0.36	55.2	0.55
M-37	P-39	Duct Maker	0.66	0.31	68.7	0.47
M-38	P-38	Duct Maker	0.66	0.29	64.4	0.44
M-35	P-41	Duct Packer	0.65	0.38	52.5	0.58
		NEOPRENE COATING				
M-28	P-79	Fiberglass Feeder	0.49	0.70	129.8	1.43
M-29	P-78	Packer	0.49	0.23	104.7	0.47
		SCRAP RECLAMATION				
M-30	P-77	Scrap Grinder	0.51	1.27	149.7	2.49
M-31	P-76	Scrap Grinder	0.51	1.09	65.6	2.14

1 *Count sample void*

2 *Impossible to get a fiber count due to high concentrations of phenolic resin in the area*

TABLE 3

GLASS BATCH SILICA AIR SAMPLE RESULTS

PERSONAL SAMPLES

SAMPLE #	*SAMPLE TYPE*	*OPERATION*	*DUST WEIGHT (Mg)*	*AIR VOLUME (M^3)*	*DUST CONC. Mg/M^3*	*% FREE SiO_2 BY WEIGHT*	*SIMULTANEOUS SAMPLE #*
P-80*	Total	Glass Batch Operator	1.64	0.76	2.16	3.1	P-81
P-81	Resp.	Glass Batch Operator	0.24	0.65	0.38	0.5	P-80
P-82	Total	Glass Batch Operator	3.91	0.76	5.15	1.6	P-83
P-83	Resp.	Glass Batch Operator	0.42	0.65	0.65	0.6	P-82
P-89	Total	Glass Batch Operator	2.56	0.60	4.34	2.3	P-88
P-88	Resp.	Glass Batch Operator	0.17	0.50	0.34	0.3	P-89

GENERAL AIR SAMPLES

SAMPLE #	*SAMPLE TYPE*	*SAMPLE LOCATION*	*DUST WEIGHT (Mg)*	*AIR VOLUME (M^3)*	*DUST CONC. Mg/M^3*	*% FREE SiO_2 BY WEIGHT*	*SIMULTANEOUS SAMPLE #*
Ag-1**	Total	At Batch Filling Cans	8.70	2.67	3.26	4.1	P-84
P-84	Resp.	At Batch Filling Cans	1.48	3.44	0.43	4.3	Ag-1
Ag-2	Total	On Top of Control Panel	2.50	2.67	0.93	4.0	P-85
P-85	Resp.	On Top of Control Panel	1.07	3.78	0.28	4.7	Ag-2
Ag-3	Total	Back Wall Near Tracks	7.60	3.03	2.34	2.2	P-86
P-86	Resp.	Back Wall Near Tracks	1.81	5.05	0.36	0.61	Ag-3
Ag-4	Total	At Record Desk	7.10	3.03	2.34	1.4	P-87
P-87	Resp.	At Record Desk	2.61	5.56	0.47	7.55	Ag-4
Ag-5	Total	At End of Control Panel	12.20	2.29	5.33	1.9	P-90
P-90	Resp.	At End of Control Panel	1.26	3.28	0.38	11.5	Ag-5
Ag-6	Total	At Wall Near Bag Storage	1.20	2.29	0.56	2.2	P-91
P-91	Resp.	At Wall Near Bag Storage	0.37	2.98	0.12	0.1	Ag-6

* *"P" series are polyvinyl chloride filters*

** *"Ag" series are silver membrane filters*

TABLE 4

BATCH HOUSE SETTLED DUST SILICA RESULTS

Location of Settled Dust Sample	% Free SiO_2 by Talvittie Method	% Free SiO_2 by x-ray Diffraction	Average % Free SiO_2
Near Hand Mixing Station	3.4	4.0	3.70
Near Unloading Dock	2.9	3.0	2.95

TABLE 5

TOTAL AIRBORNE PHENOLIC COMPOUND CONCENTRATIONS

IN

PRODUCTION AREAS

PITTSBURGH PLATE GLASS
Shelbyville, Indiana

SAMPLE #	*SAMPLE LOCATION*	*AIR VOLUME LITERS*	*PHENOLIC CONC. PPM*
Phenol-1	At control panel of 203 Superfine	105	0.16
Phenol-2	Forming platform of rotary line	144	0.24
Phenol-3	Curing oven discharge in molded pipe insulation	69	0.19
Phenol-4	Curing oven in Textrafine	73	0.23
Phenol-5	At Foreman's desk in pipe insulation	70	Void

PARTICULATE FREE PHENOL CONCENTRATIONS

IN

TEXTRAFINE OPERATION

SAMPLE #	*JOB TITLE OR SAMPLE LOCATION*	*AIR VOLUME LITERS*	*PHENOLIC CONC. mg/m^3*
CTP - 1	Textrafine Machine Operator	Void	Void
CTP - 2	Textrafine Machine Operator	500	1.0
CTP - 3	Textrafine Machine Operator	506	0.8
CTP - 4	At Textrafine Curing Oven	62	0.3
CTP - 6	At Textrafine Curing Oven	467	0.1

TABLE 6

FORMALDEHYDE SAMPLE RESULTS

Pittsburgh Plate Glass
Shelbyville, Indiana

SAMPLE #	*LOCATION*	*AIR VOLUME LITERS*	*FORMALDEHYDE CONC. PPM*
1	At Forming Station Superfine #203	188.4	0.02
2	At Control Panel Superfine #203	134.6	0.01
3	At Control Panel of Uncured Mat Line	80.7	0.02
4	At Curing Oven in Molded Pipe	161.5	0.08

TABLE 7

ORGANIC SOLVENT SAMPLE RESULTS

IN

GLASSFLEX AND MOLDED PIPE AREAS

PERSONAL SAMPLES

SAMPLE #	*JOB TITLE*	*AIR VOLUME LITERS*	*CONCENTRATIONS PPM*	
			*Acetone**	*n Hexane**
1	Pipe Former, Glassflex	10.0	29	181
2	Pipe Former, Glassflex	10.0	14	61
3	Pipe Former, Glassflex	10.2	21	180
4	Pipe Former, Glassflex	10.1	21	67
5	Molded Pipe Finisher	10.0	58	**
6	Molded Pipe Finisher	10.0	25	**

* *Present standards for acetone and n-hexane are 1,000 and 500 ppm respectively*

** *No n-hexane used in this solvent*

TABLE 8

SUMMARY OF PARTICLE AND FIBER SIZE ANALYSIS
BY
OPTICAL MICROSCOPY

FIBER SIZE

OPERATION	*TYPE OF SAMPLE ANALYZED*	*DIAMETER, μ*		*LENGTH, μ*	
		Median	*Geo Std Dev*	*Median*	*Geo Std Dev*
Superfine	Airborne	2.8	2.0	70	2.7
Textrafine	Airborne	3.9	1.6	64	2.5
Molded Pipe	Airborne	2.1	1.7	39	2.8
Glassflex	Airborne	3.8	1.9	50	4.2
Rotary	Airborne	2.3	1.7	37	3.0

PARTICLE SIZE

OPERATION	*TYPE OF SAMPLE ANALYZED*	*DIAMETER, μ**	
		Median	*Geo Std Dev*
Textrafine Phenolic Resin	Airborne	2.0	2.8
Batch House Settled Dust	Settled Dust		
Quartz **		15.0	1.7
Other Dust		2.0	2.8

* *All particle diameters are "feret" diameters*

** *Dispersion staining microscopy used to identify and size quartz particles*

TABLE 9

NOISE SURVEY RESULTS

TEST NO	REFER TO FIGURE NO	PREDOMINANT NOISE SOURCE	dB READINGS As	Bs	Cs
1	3	#204-5ft. behind curtain at employees work site-curtains completely open	113	115	116
2	3	#203-5ft. behind curtain at employees work site-curtains partially closed	112	114	115
3	3	#202-5ft. behind curtain at employees work site-curtains completely closed	111	112	113
4	3	#201-5ft. behind curtain in front of control panel-curtains were closed-higher dB because of reflective noise	113	115	115
5	3	#203-inside curtain	116	117	118
6	3	#204-inside curtain	117	118	119
7	3	#201-inside curtain	117	119	119
8	3	Between #202 & #203 in forming area	94	97	98
9	3	Between #204 & #205 in forming area (#205 not in operation at time of measurement)	93	96	97
10	3	Upstairs above #204 furnace	94	97	98
11	3	Upstairs above #203 furnace	94	97	98
12	3	Between #204 & #205 in curing area	85	88	93
13	3	Between #202 & #203 in curing area	86	91	94
14*	3	#201-5ft. from where finished product was taken off of line	81	86	93
15*	3	#202-5ft. from where finished product was taken off of line	78	85	89
16*	3	#203-5ft. from where finished product was taken off of line	78	86	89

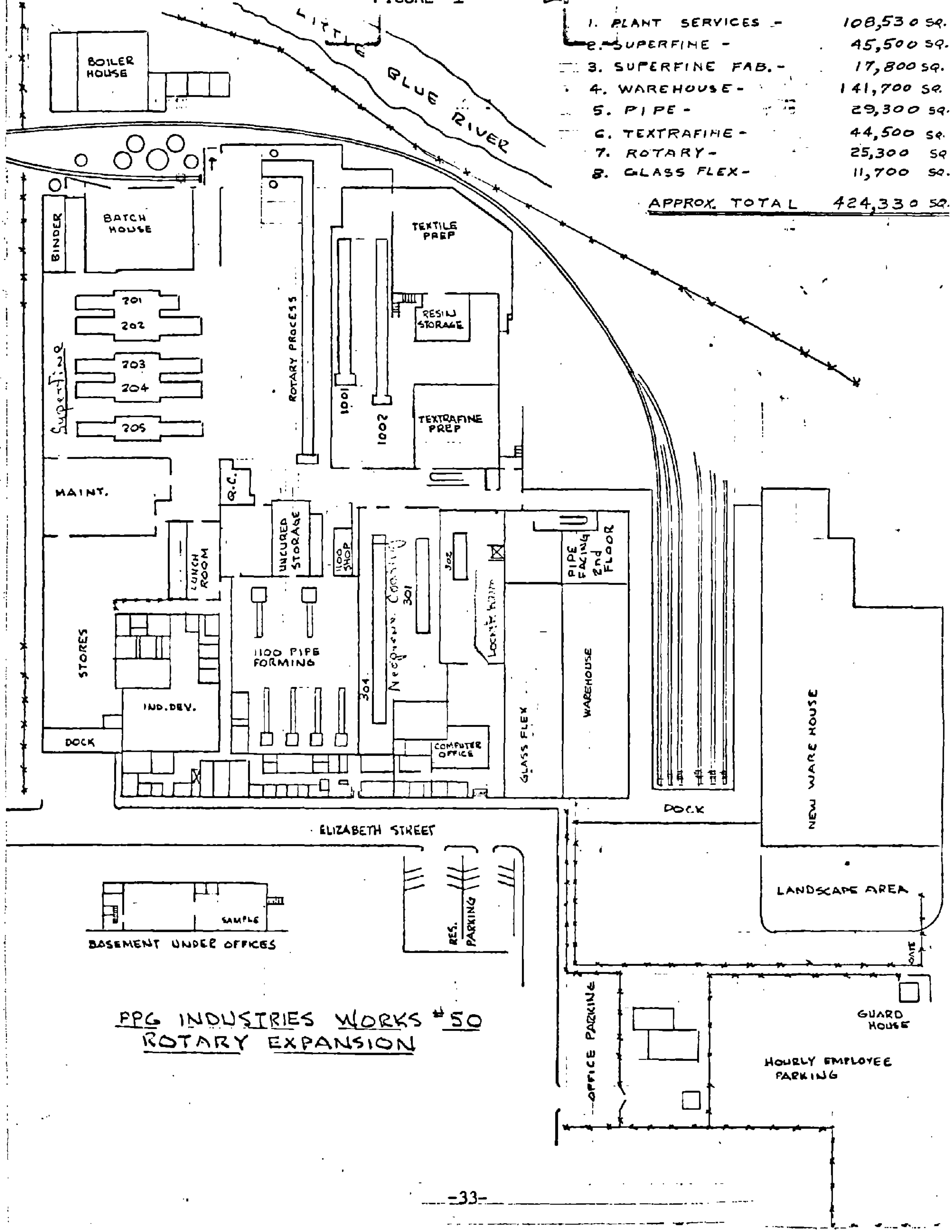
TEST NO	REFER TO FIGURE NO	PREDOMINANT NOISE SOURCE	dB READINGS As	Bs	Cs
17*	3	#204-5ft. from where finished product was taken off of line	78	84	88
18	5	Between operator #1001 & 1002-Garnet & Carding	89	94	95
19	5	Between operator #1001 & 1002-where product was coming out of the curing ovens	85	89	93
20	5	Taking finished product off of operator #1001	82	86	88
21	5	Taking finished product off of operator #1002	81	85	88
22	6	Next to manual pipe forming oven #1100	82	85	88
23	6	Between manual pipe forming ovens #1100 (one oven not in operation at time of measurement)	81	84	87
24	6	Near automated pipe forming oven where fiber mates are wraped around the mandrels NOTE: the dropping of mandrels approximately every 5 seconds increased dB values----------	88 up to 96	92 up to 97	95 up to 98
25	6	Middle of pipe forming room	83	86	88
26	4	Where finished product was taken off the rotary process	77	83	86
27	4	At the cutter on the rotary process	77	83	87
28	4	Next to the curing oven on the rotary process (downstairs)	79	84	87
29	4	Next to the spinners in the forming area on the rotary process (upstairs)	98	101	103
30	4	Inside the control room next to the spinners (upstairs)	75	84	87
31	-	Taking off finished product on operator #301	78	83	85
32	-	In the middle of the glassflex room (only 3 of the 6 machines were in operation)	72	73	76

TEST NO	*REFER TO FIGURE NO*	*PREDOMINANT NOISE SOURCE*	*dB READINGS* *As*	*Bs*	*Cs*
33	-	Textrafine prep room - next to scrap grinder	82	89	95
34	-	Textile prep room - taken in middle of room	84	88	92
35	-	Pipe facing (2nd Floor) taken in middle of room	76	78	79
36	7	Batch House-next to mixing operation	79	84	86

* - On measurements 14 through 17
All shown dB values were exceeded by 2 to 3 dB's when compressed air was used, fork lift trucks went by and when the hydraulic jacks released the fiberglass rolls at the ends of each line.

FIGURE 1

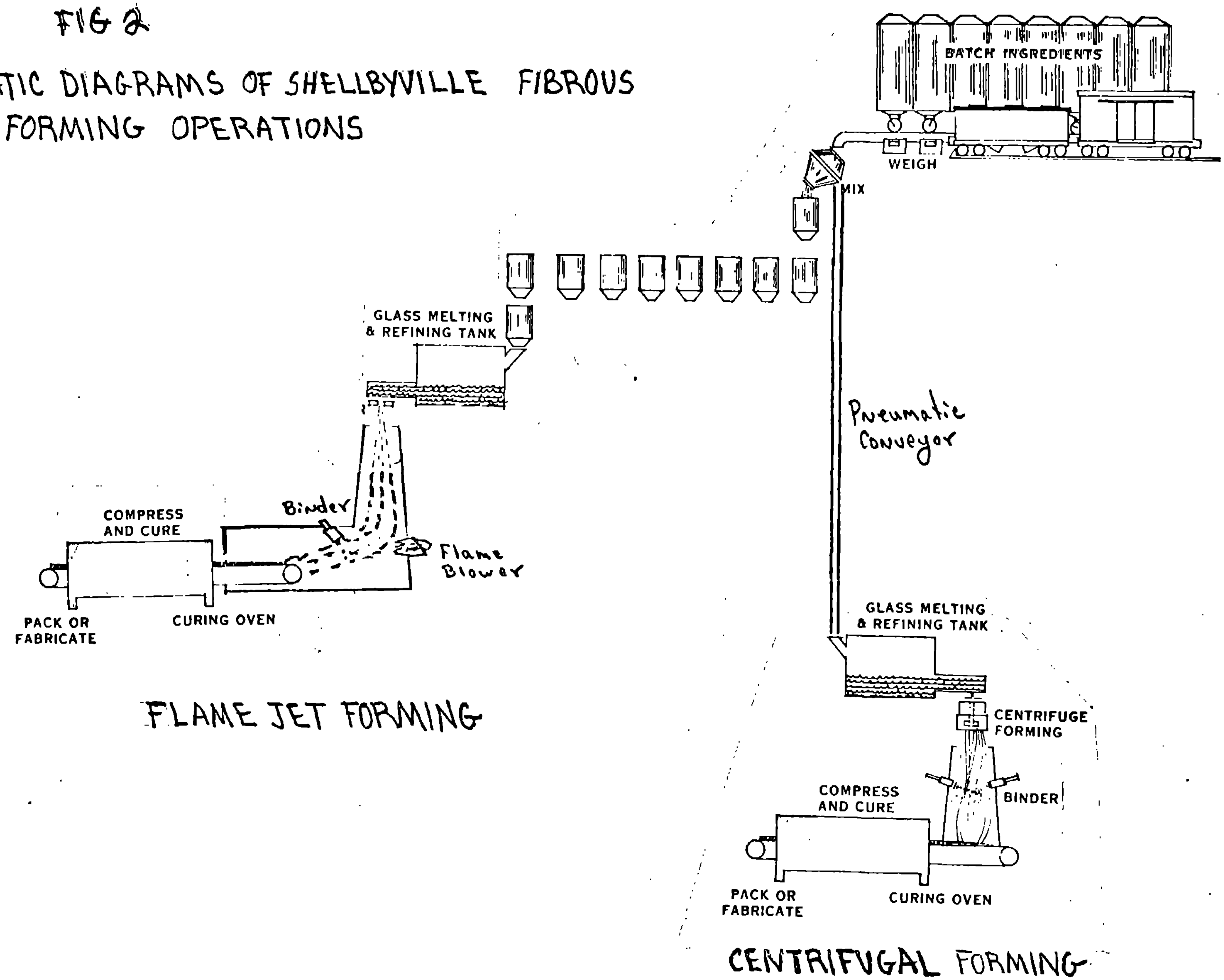
1.	PLANT SERVICES -	108,530 SQ.
2.	SUPERFINE -	45,500 SQ.
3.	SUPERFINE FAB. -	17,800 SQ.
4.	WAREHOUSE -	141,700 SQ.
5.	PIPE -	29,300 SQ.
6.	TEXTRAFINE -	44,500 SQ.
7.	ROTARY -	25,300 SQ
8.	GLASS FLEX -	11,700 SQ.
	APPROX. TOTAL	424,330 SQ.



PPG INDUSTRIES WORKS #50
ROTARY EXPANSION

FIG 2

SCHEMATIC DIAGRAMS OF SHELLBYVILLE FIBROUS GLASS FORMING OPERATIONS



KEY TO SAMPLE LOCATIONS

FOR

FIGURES 3-7

$\bigcirc_{\#}$ Phenolic Compounds Stationary Sample

$\triangle_{\#}$ Formaldehyde Station Sample

$\square_{\#}$ Paired Stationary Silica Dust Samples

$*_{\#}$ Point of Noise Measurement

FIG 3 SUPERFINE AREA

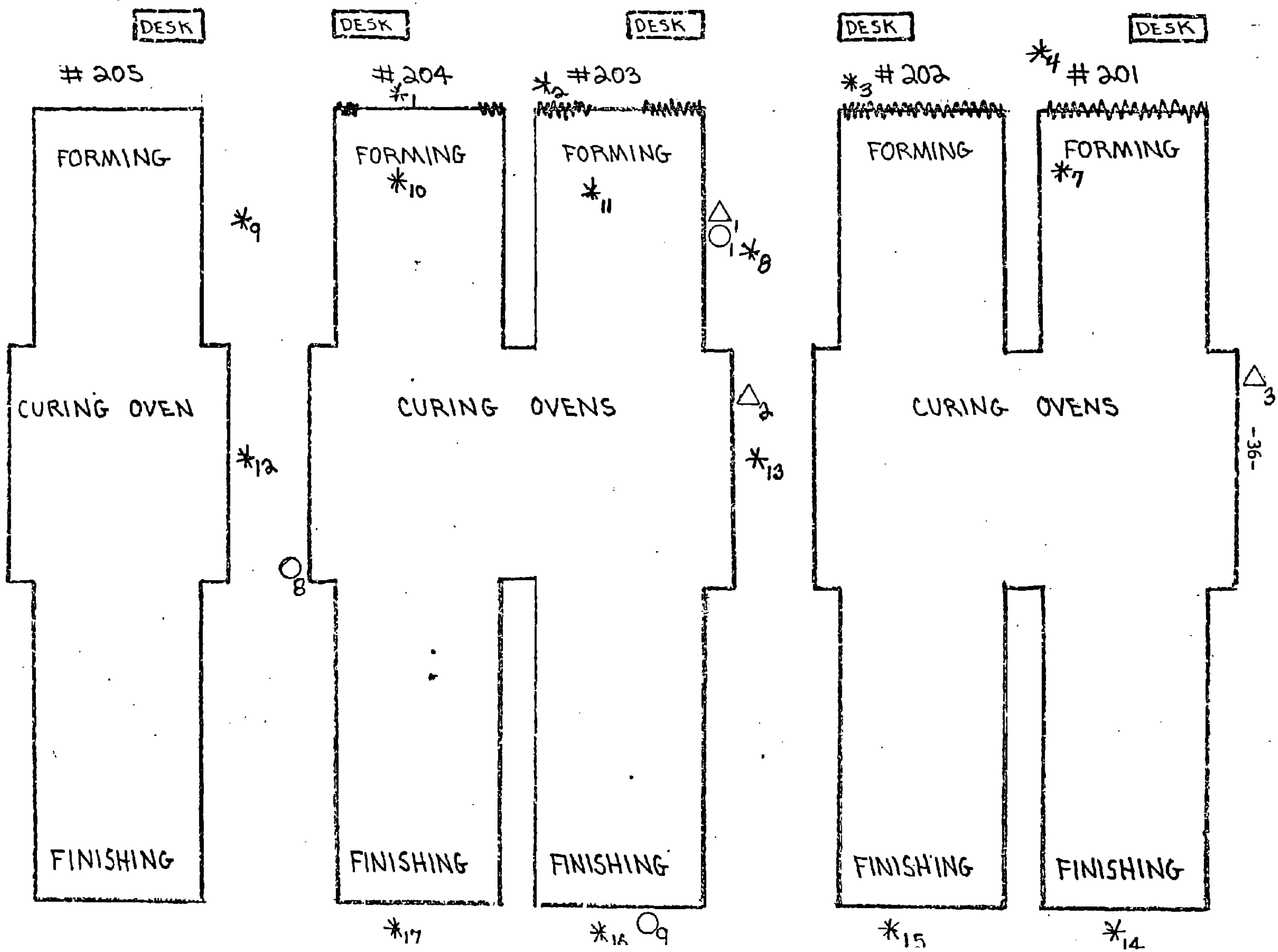


FIG 4 ROTARY

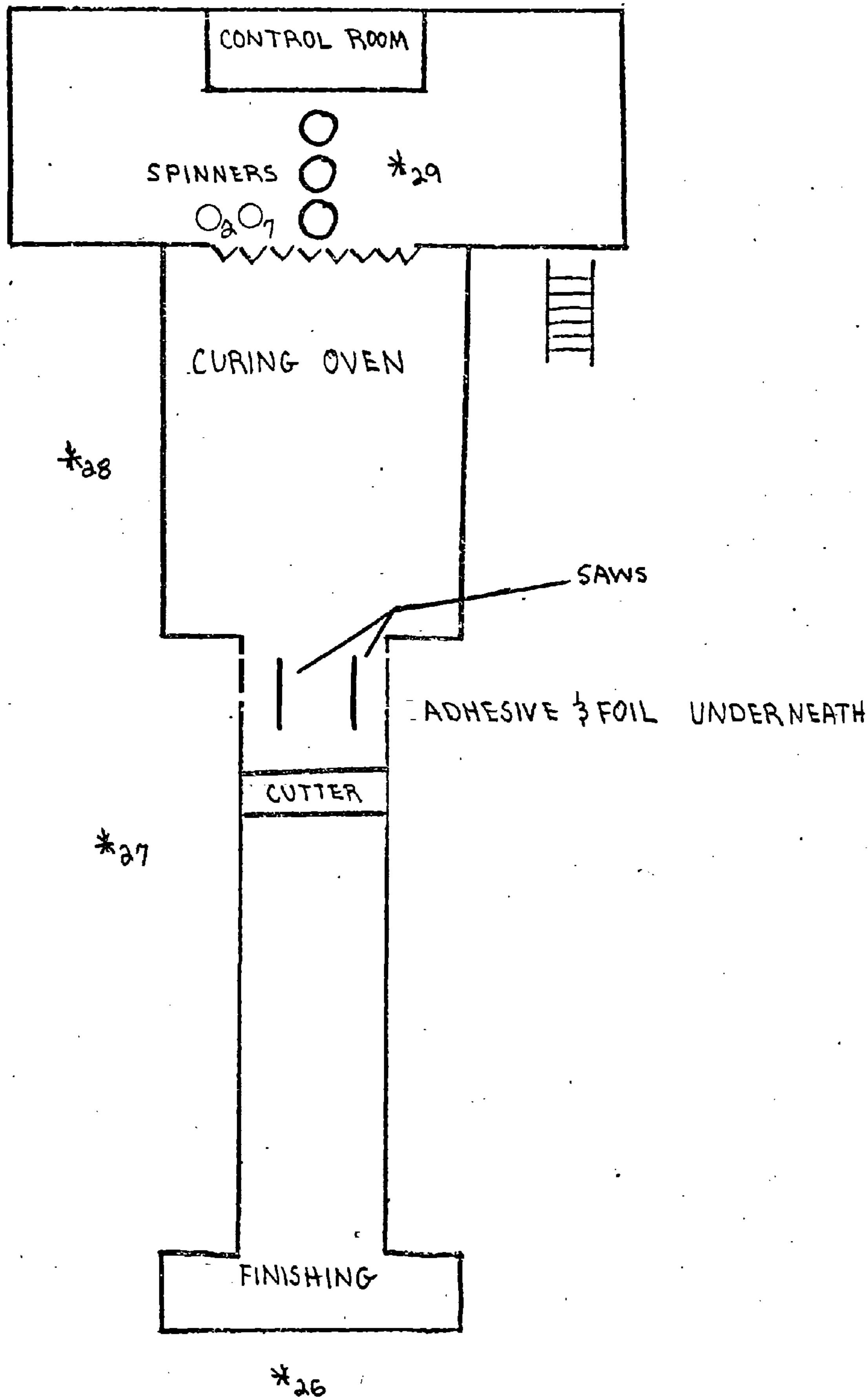

CONTROL ROOM
SPINNERS
*29
$O_2 O_7$
CURING OVEN
*28
SAWS
ADHESIVE & FOIL UNDERNEATH
CUTTER
*27
FINISHING
*26

FIG 5 TEXTRAFINE AREA

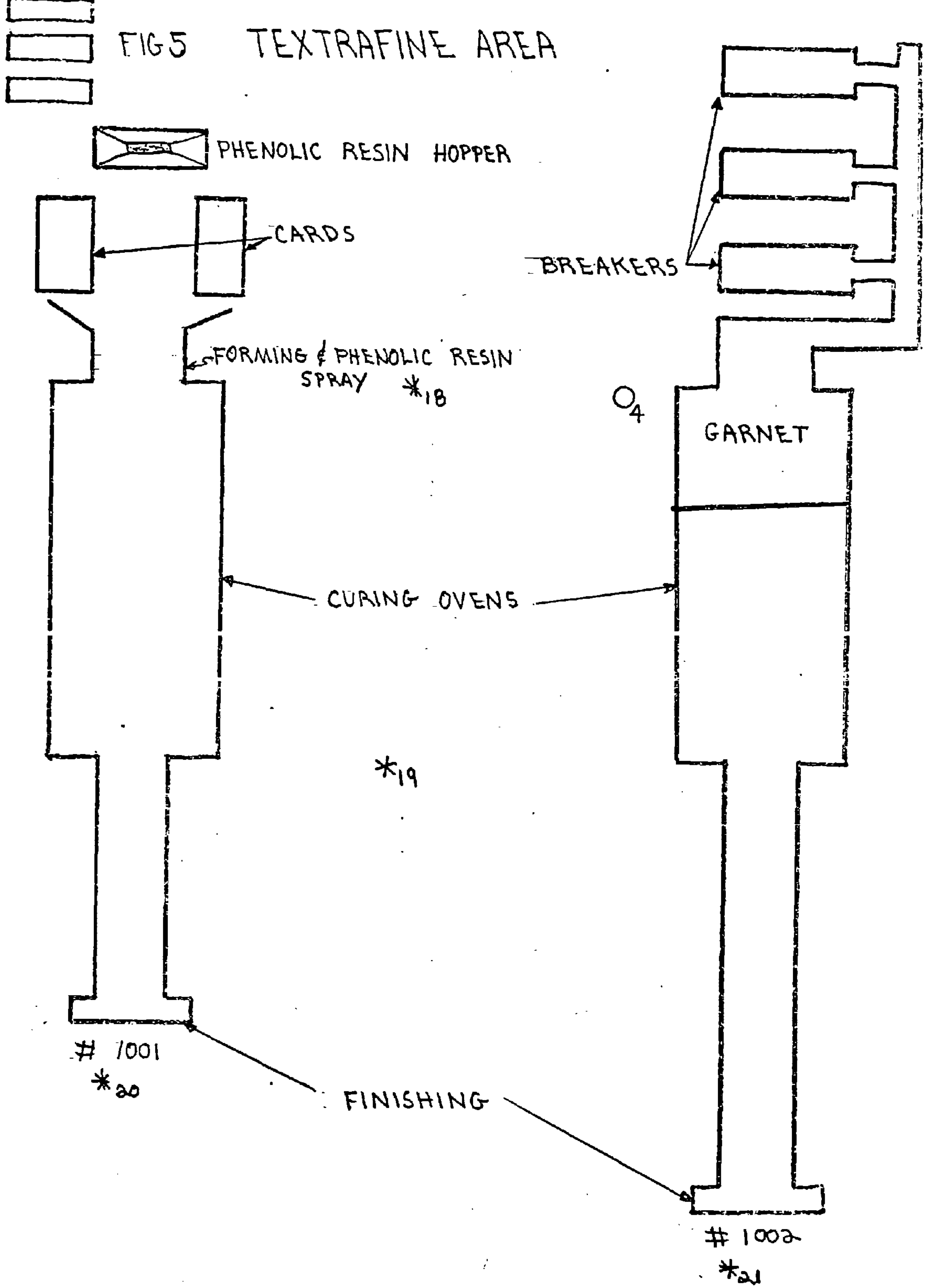


FIG 6 PIPE FORMING

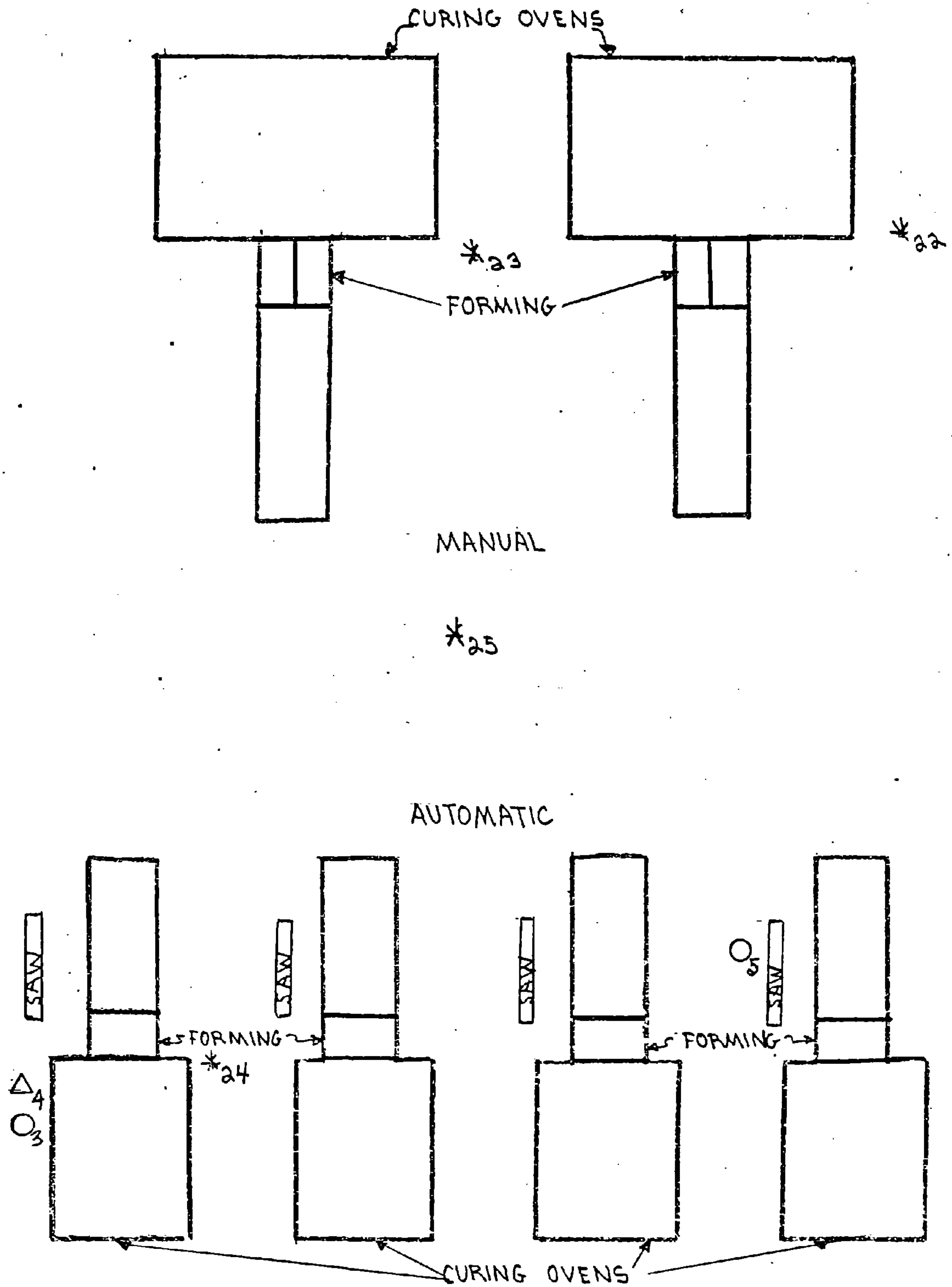


FIG 7

GLASS BATCH

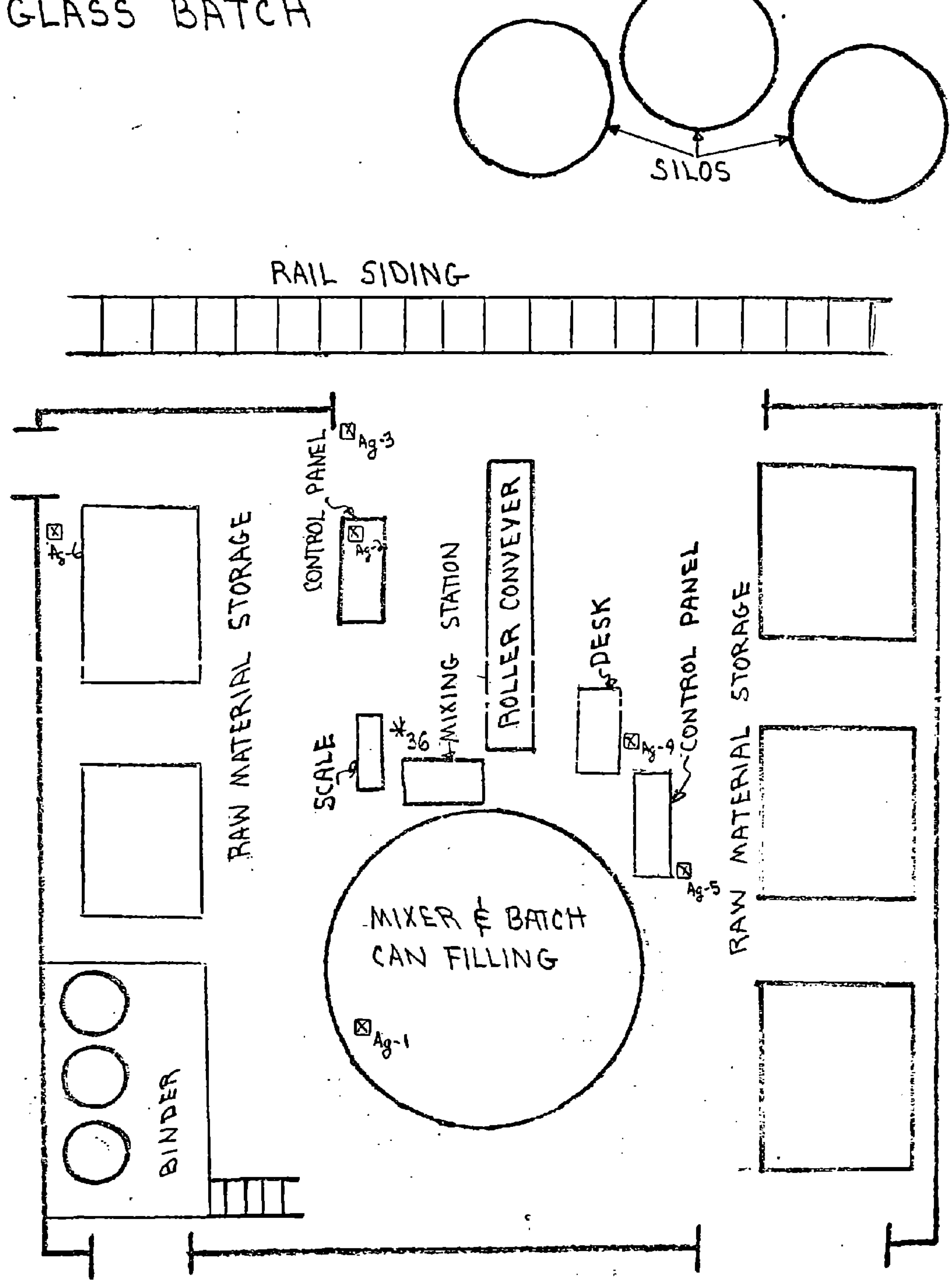


FIG 8

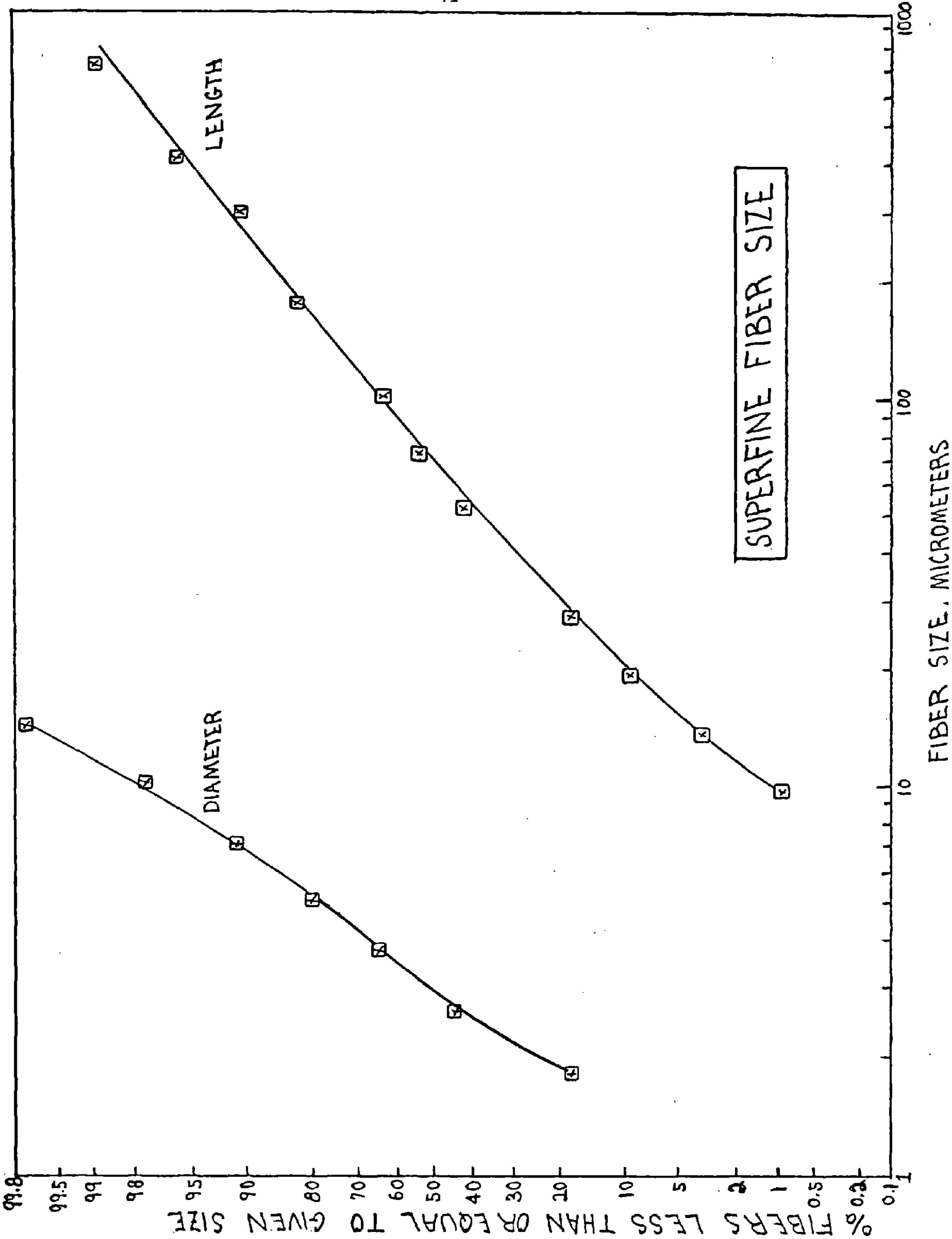

SUPERFINE FIBER SIZE
LENGTH
DIAMETER
FIBER SIZE, MICROMETERS
% FIBERS LESS THAN OR EQUAL TO GIVEN SIZE
1
10
100
1000
99.8
99.5
99
98
95
90
80
70
60
50
40
30
20
10
5
2
1
0.5
0.2
0.1

FIG. 9

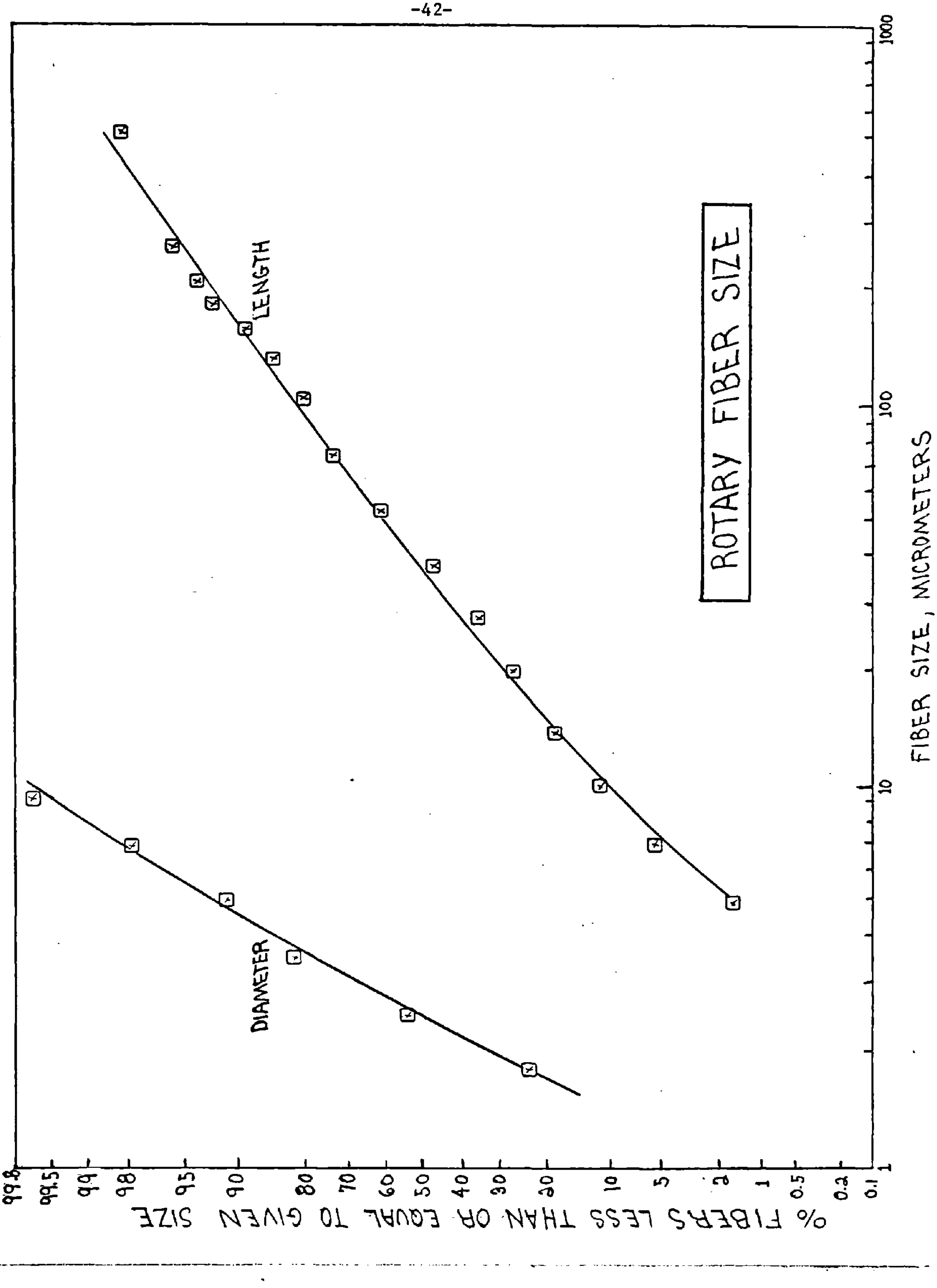

ROTARY FIBER SIZE
LENGTH
DIAMETER
FIBER SIZE, MICROMETERS
1
10
100
1000
% FIBERS LESS THAN OR EQUAL TO GIVEN SIZE
99.8
99.5
99
98
95
90
80
70
60
50
40
30
20
10
5
2
1
0.5
0.2
0.1

FIG. 10

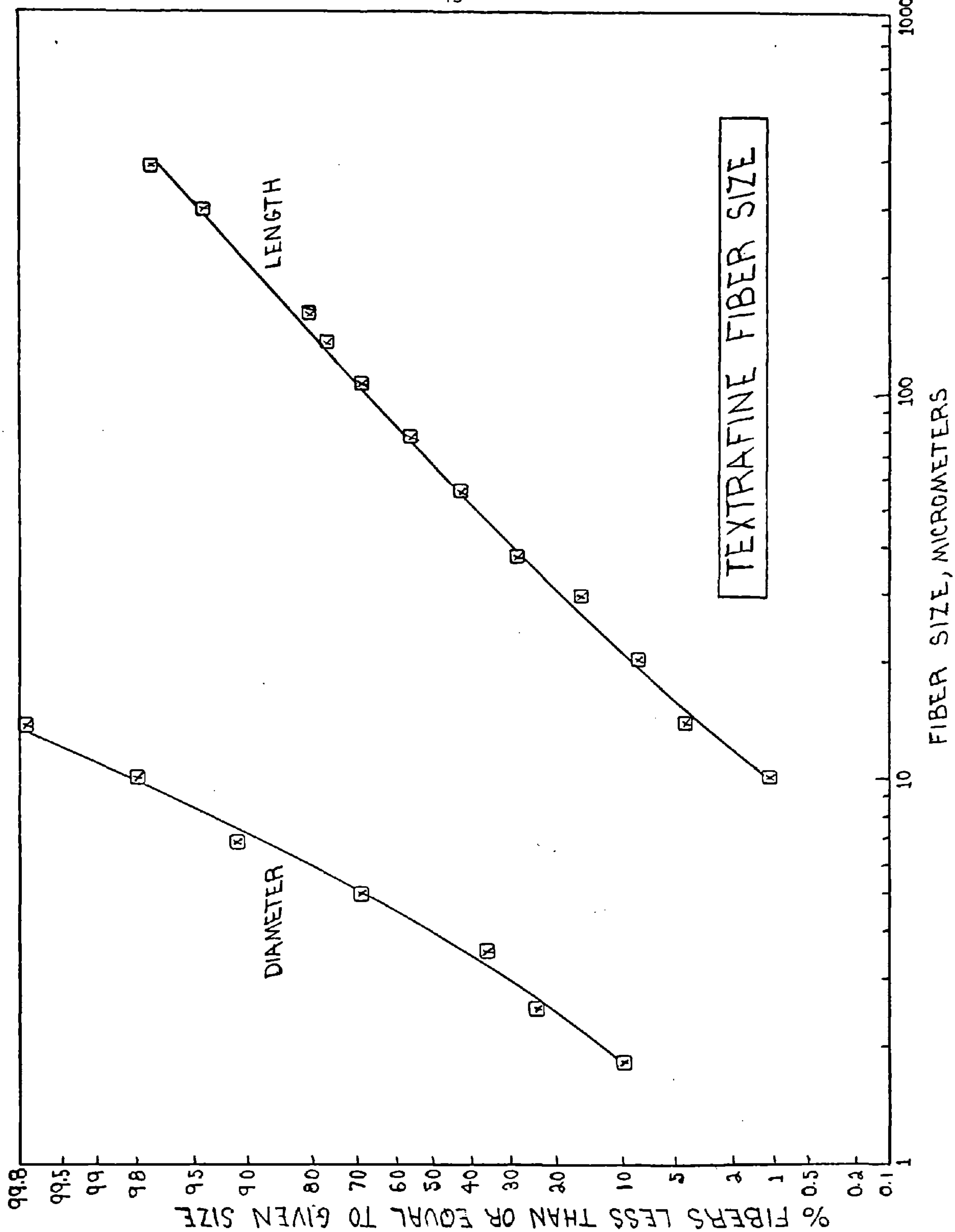

TEXTRAFINE FIBER SIZE
LENGTH
DIAMETER
FIBER SIZE, MICROMETERS
1
10
100
1000
% FIBERS LESS THAN OR EQUAL TO GIVEN SIZE
99.8
99.5
99
98
95
90
80
70
60
50
40
30
20
10
5
2
1
0.5
0.2
0.1

FIG 11

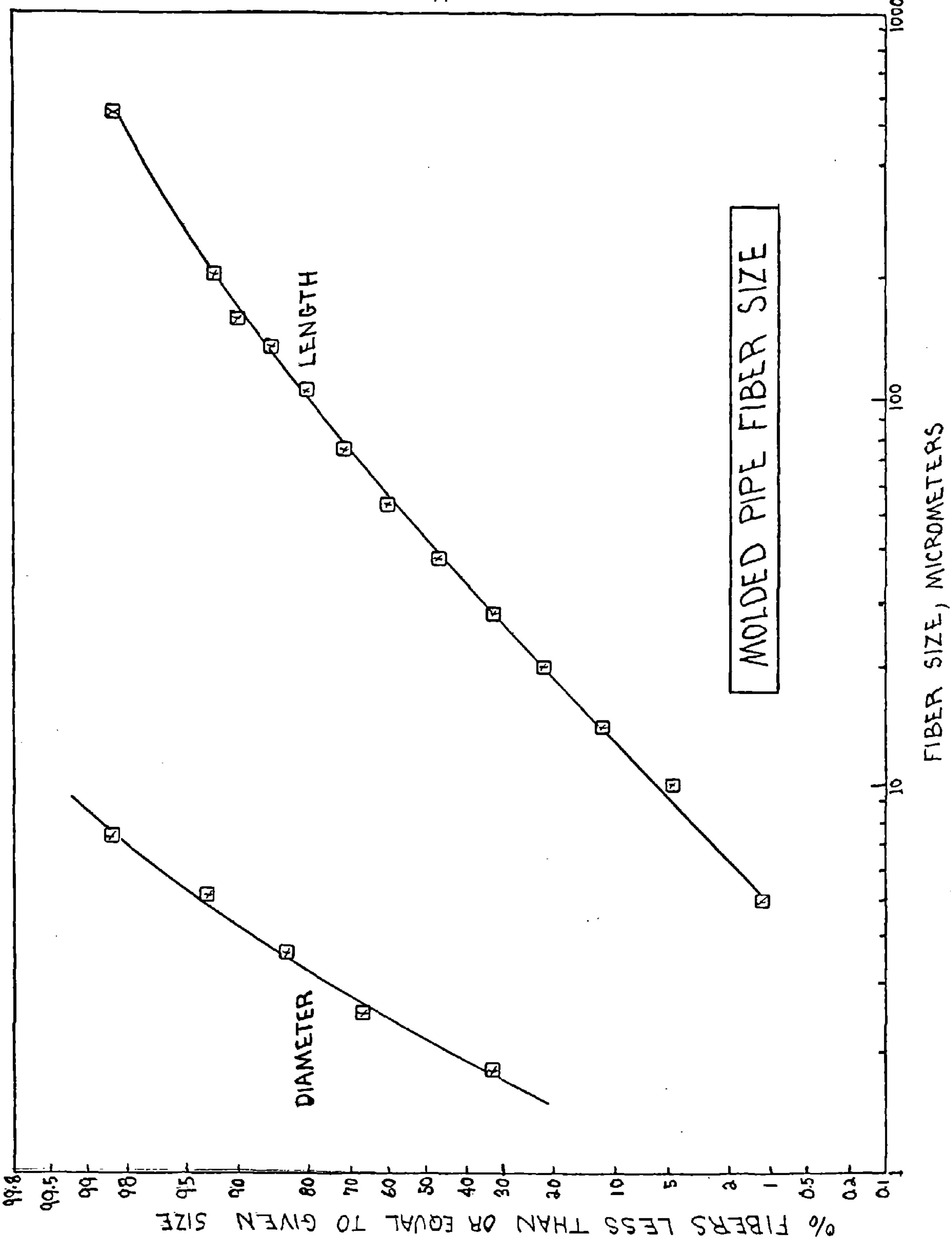

MOLDED PIPE FIBER SIZE
LENGTH
DIAMETER
FIBER SIZE, MICROMETERS
% FIBERS LESS THAN OR EQUAL TO GIVEN SIZE
1
10
100
1000
99.8
99.5
99
98
95
90
80
70
60
50
40
30
20
10
5
2
1
0.5
0.2
0.1

FIG. 12

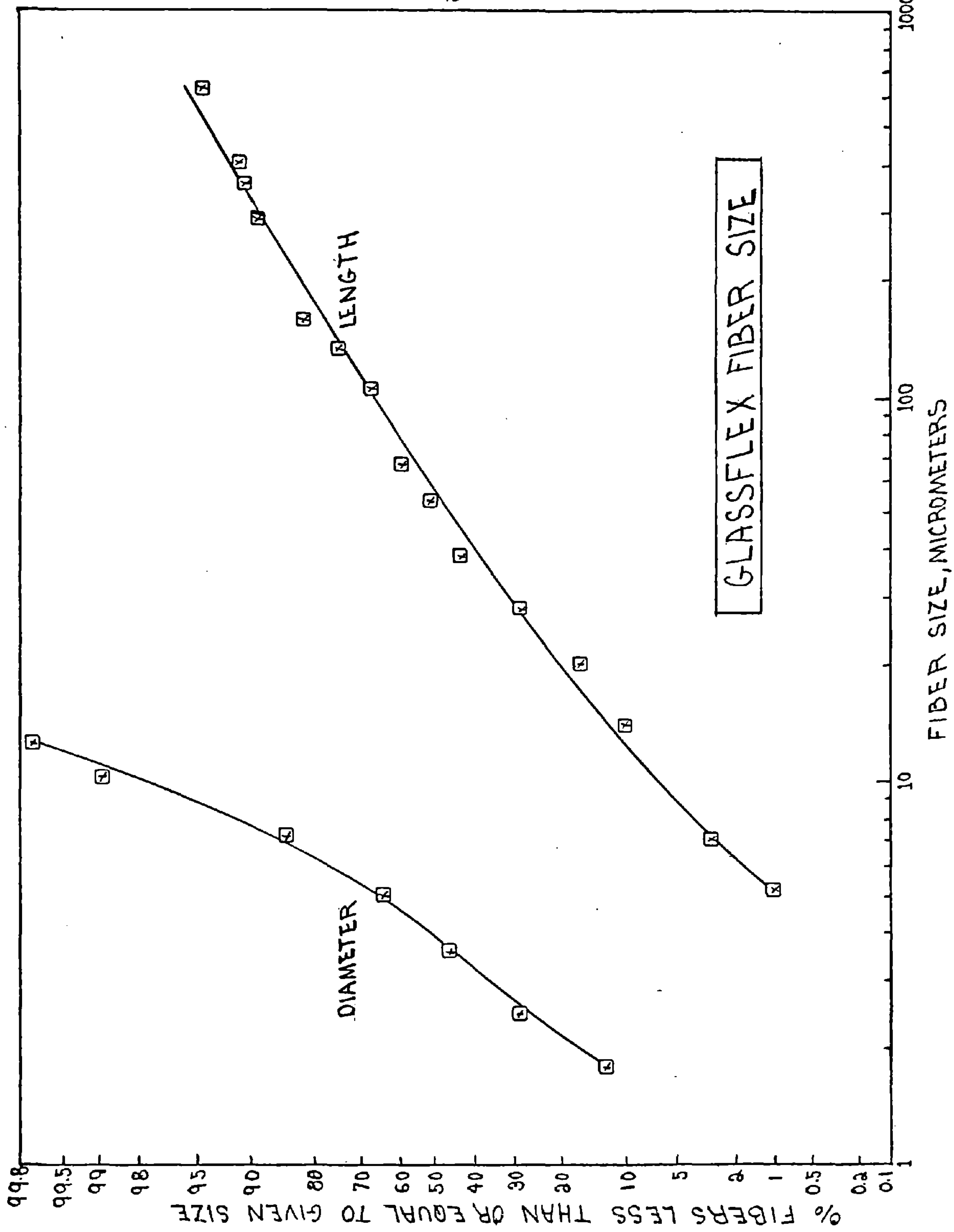

GLASSFLEX FIBER SIZE
LENGTH
DIAMETER
FIBER SIZE, MICROMETERS
% FIBERS LESS THAN OR EQUAL TO GIVEN SIZE
1
10
100
1000
99.8
99.5
99
98
95
90
80
70
60
50
40
30
20
10
5
2
1
0.5
0.2
0.1

FIG 13

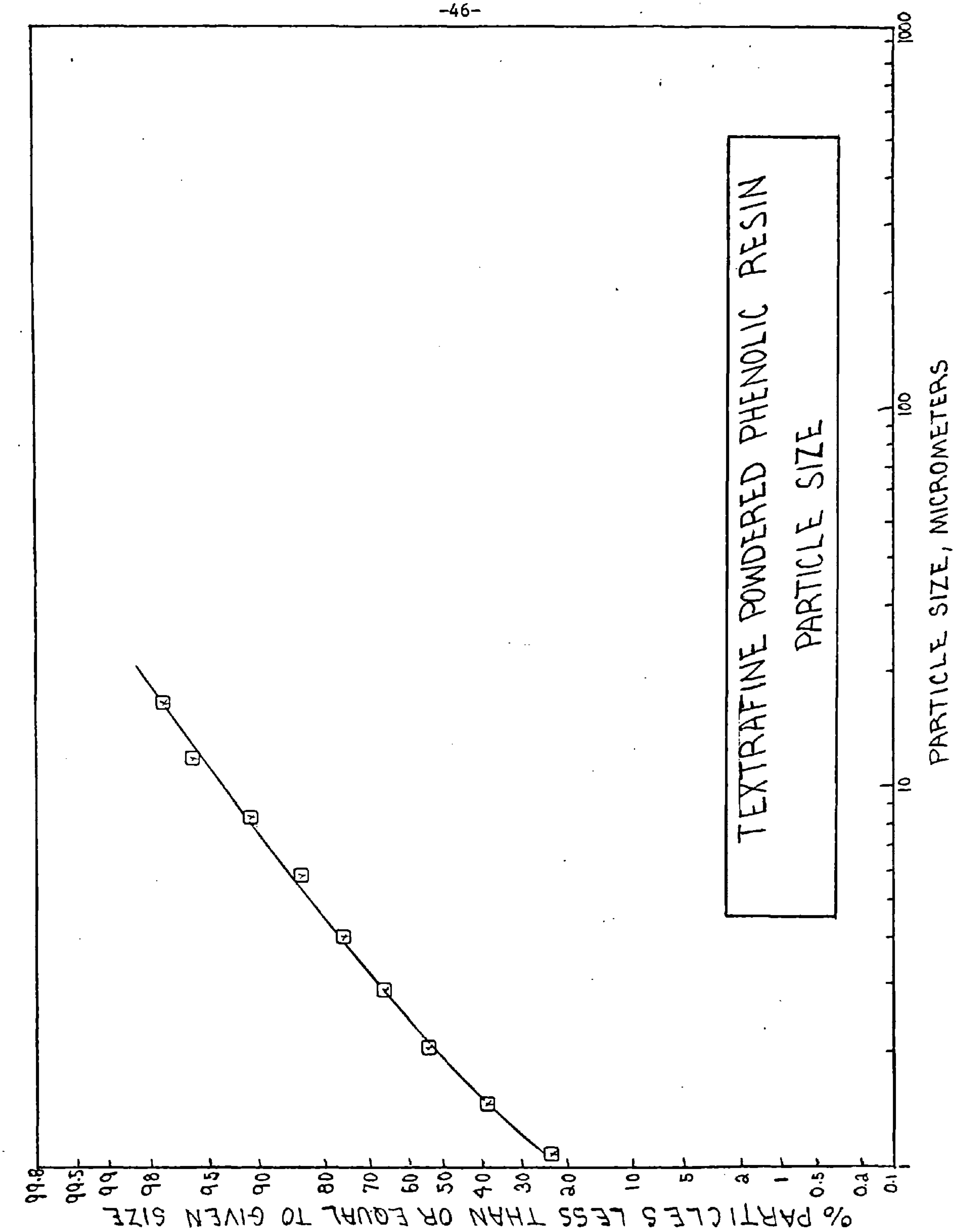

TEXTRAFINE POWDERED PHENOLIC RESIN
PARTICLE SIZE
PARTICLE SIZE, MICROMETERS
10
100
1000
% PARTICLES LESS THAN OR EQUAL TO GIVEN SIZE
0.1
0.2
0.5
1
2
5
10
20
30
40
50
60
70
80
90
95
98
99
99.5
99.8

FIG 14

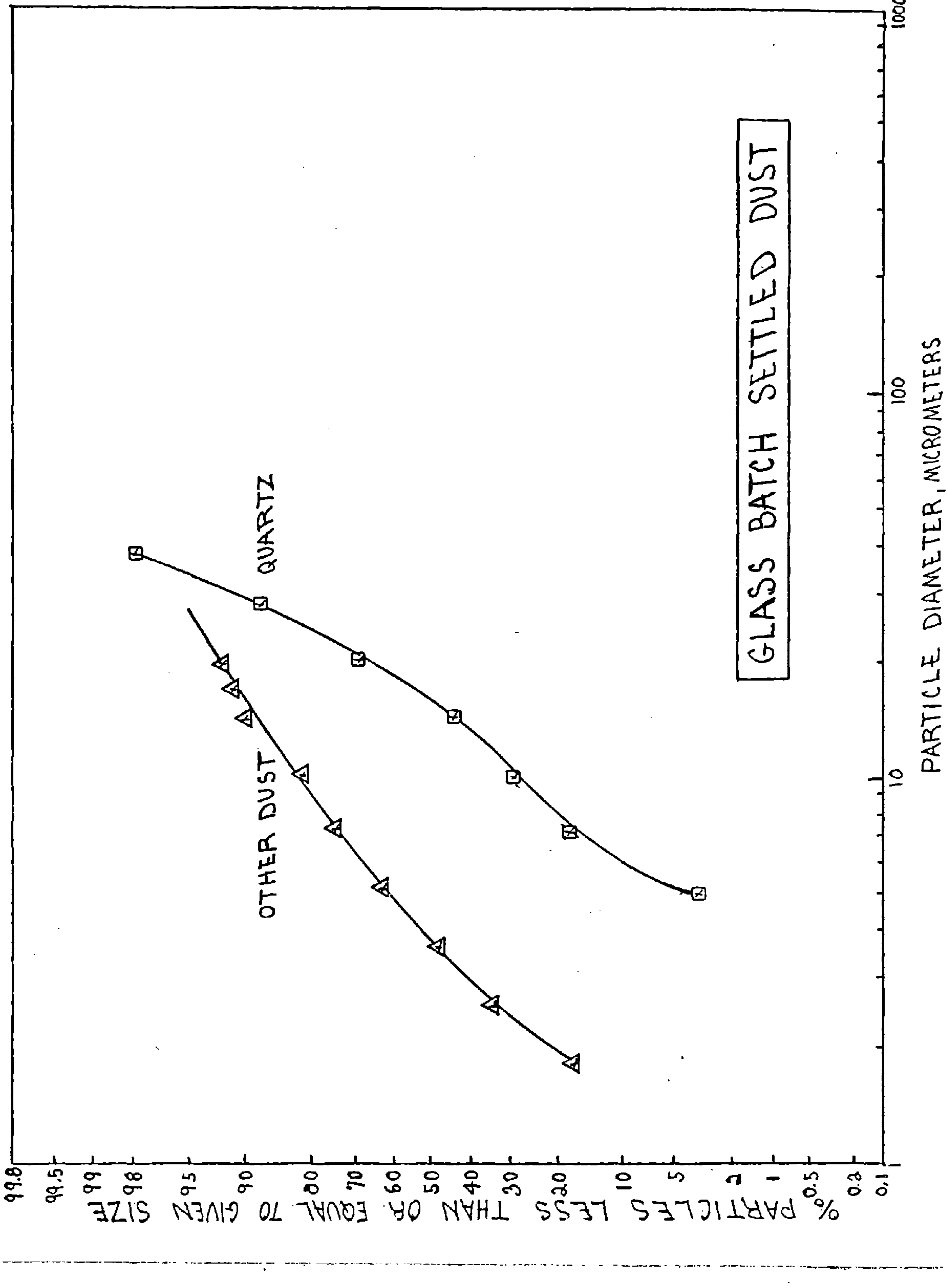
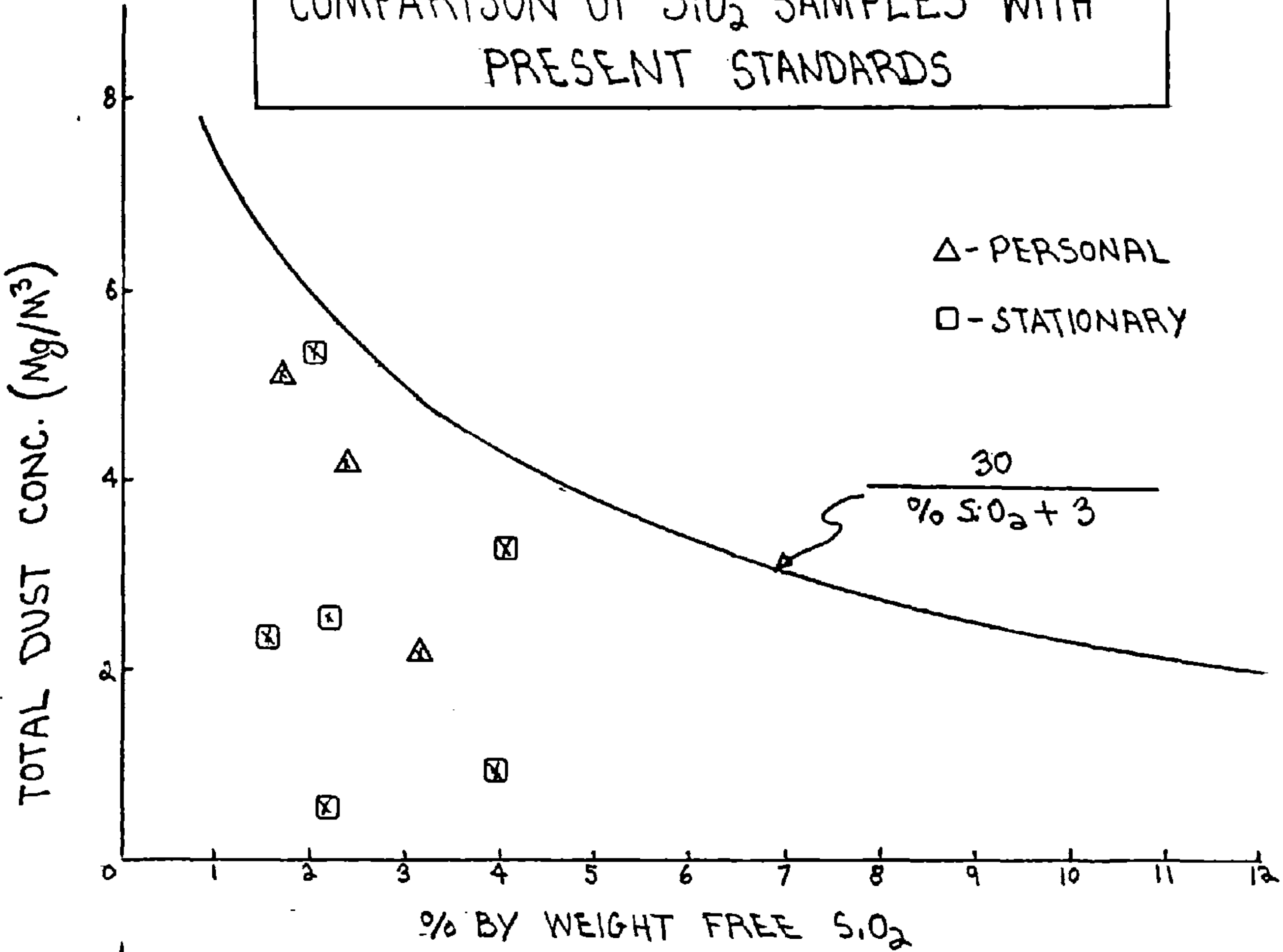
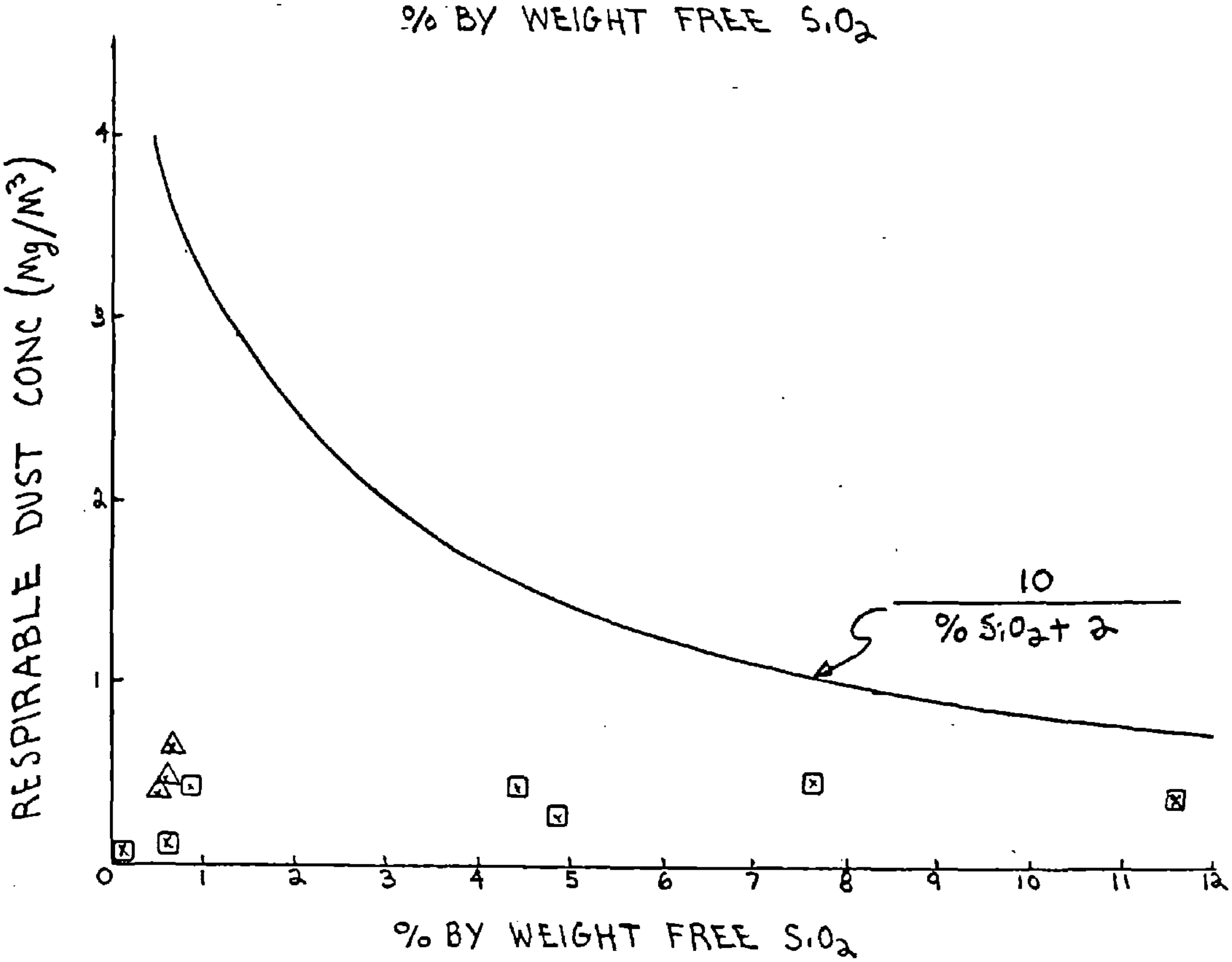

GLASS BATCH SETTLED DUST
QUARTZ
OTHER DUST
PARTICLE DIAMETER, MICROMETERS
10
100
1000
% PARTICLES LESS THAN OR EQUAL TO GIVEN SIZE
99.8
99.5
99
98
95
90
80
70
60
50
40
30
20
10
5
2
1
0.5
0.2
0.1

FIG. 15

COMPARISON OF SiO_2 SAMPLES WITH PRESENT STANDARDS





ATTACHMENT I

PPG INDUSTRIES

MEDICAL HISTORY AND PHYSICAL EXAMINATION RECORD

SECTION I.

NAME	SEX	AGE	DATE
HOME ADDRESS			SOCIAL SECURITY NO.
COMPANY	DIVISION		LOCATION
JOB TITLE		YEARS ON JOB	YEARS WITH COMPANY
FAMILY DOCTOR'S NAME			PHONE
FAMILY DOCTOR'S ADDRESS			
NAME OF PERSON TO NOTIFY IN CASE OF EMERGENCY			
ADDRESS			PHONE

TYPE OF EXAMINATION:

☐ PREPLACEMENT ☐ PERIODIC ☐ PRE-RETIREMENT ☐ REEMPLOYMENT REINSTATEMENT

☐ DISABILITY ☐ OCCUPATIONAL HEALTH ☐ SPECIAL FOR: ____________

SECTION II.

MEDICAL HISTORY - Please Print All Entries.

Your answers to the following questions are to assist in placing you in a job safe to yourself and others and in making such health studies as are indicated. Information which you supply will be held in strict confidence by the Medical Department but may be used as a basis for job placement and PPG Industries, Inc. insurance determinatior Any material omission or falsification will be reason for discharge. If this is your first examination for the Company, or your first one using this form, answer all questions; otherwise, answer only those questions that would update information since you last completed this form.

1. CIRCLE HIGHEST GRADE YOU COMPLETED IN SCHOOL: YOUR AGE ON LEAVING SCHOOL

ELEMENTARY 1 2 3 4 5 6 7 8 HIGH 1 2 3 4 COLLEGE 1 2 3 4

	YES	NO
2. HAVE YOU EVER WORKED IN DUSTY TRADE, SUCH AS MINING, A FOUNDRY, SAND BLASTING, CHIPPING, GRINDING, CHEMICAL OR OTHER?		
3. HAVE YOU EVER WORKED WITH X-RAY OR RADIOACTIVE SUBSTANCES?		
4. HAVE YOU SHOWN SENSITIVITY TO SUNLIGHT, CHEMICALS, DUSTS OR OTHER MATERIALS?		
5. HAVE YOU EVER WORKED WITH POISONOUS MATERIALS?		
6. HAVE YOU EVER WORKED IN A NOISY ENVIRONMENT?		
7. HAVE YOU EVER REQUIRED A SPECIAL JOB ASSIGNMENT BECAUSE OF THE EFFECTS OF ILLNESS, INJURY, OR PHYSICAL IMPAIRMENT?		
8. HAVE YOU EVER BEEN REJECTED FOR A JOB OR HAVE YOU LOST A JOB OR QUIT BECAUSE OF YOUR HEALTH?		
9. HAVE YOU EVER RECEIVED COMPENSATION OR A CASH SETTLEMENT FOR INJURIES, DISEASE OR OTHER MEDICAL PROBLEMS FROM AN EMPLOYER OR INSURANCE COMPANY?		
10. HAVE YOU EVER FILED A CLAIM OR HAVE YOU ANY CLAIM PENDING FOR INJURIES OR ILLNESSES RELATED TO YOUR WORK?		
11. HAVE YOU LOST TIME FROM WORK DUE TO ILLNESS OR INJURY IN PAST 5 YEARS?		
12. HAVE YOU BEEN REFUSED INSURANCE BECAUSE OF YOUR HEALTH?		

LIST NUMBER AND EXPLAIN BRIEFLY ANY YES ANSWERS:

13. HAVE YOU EVER SERVED IN THE ARMED FORCES?		
14. DID YOU RECEIVE A MEDICAL DISCHARGE?		
IF YES, GIVE REASONS:		
15. HAVE YOU EVER FILED A CLAIM OR RECEIVED PAYMENT FOR A DISABILITY FROM THE GOVERNMENT?		

16. HOW MANY JOBS HAVE YOU HAD IN THE PAST 3 YEARS? ______ WHAT IS THE LONGEST PERIOD YOU HELD ANY JOB? ________ MONTHS

USUAL OCCUPATION?

17. ARE YOU:

☐ SINGLE ☐ MARRIED ☐ DIVORCED ☐ SEPARATED ☐ WIDOWED

REV. 2/1/68

SECTION II. Cont.

HAS ANY MEMBER OF YOUR FAMILY (PARENTS, BROTHERS, SISTERS, GRANDPARENTS, UNCLES, AUNTS) EVER HAD: (✓ ITEMS THAT APPLY)

18. ☐ TUBERCULOSIS   19. ☐ DIABETES   20. ☐ EPILEPSY   21. ☐ MENTAL ILLNESS   22. ☐ CANCER

23. ☐ HEART TROUBLE   24. ☐ ALLERGIES   25. ☐ GLAUCOMA   26. ☐ HIGH BLOOD PRESSURE   27. ☐ KIDNEY DISEASE

28. IS YOUR WIFE (HUSBAND) IN GOOD HEALTH? ☐ YES ☐ NO IF NO, EXPLAIN:

HOW MANY CHILDREN DO YOU HAVE? ______ OLDEST ______ YOUNGEST ______ ARE YOUR CHILDREN IN GOOD HEALTH?

☐ YES ☐ NO IF NO, EXPLAIN:

Have you ever had or have you now: (Check every item or write "Don't Know")

SECTION III.

	YES	NO		YES	NO		YES	NO
1. HEADACHES (FREQUENT OR SEVERE)			34. SWELLING OF FEET AND ANKLES			65. FOOT TROUBLE		
2. INJURY OR CONCUSSION			35. DO YOU USE MORE THAN 1 PILLOW			66. FRACTURED OR BROKEN BONES		
3. BLACKOUT, DIZZINESS, FAINTING SPELLS			36. ENLARGED OR VARICOSE VEINS			67. DEFORMITIES OF LEGS, FEET, ARMS, HANDS, BACK		
4. DOUBLE VISION			37. LOSS OF APPETITE			68. AMPUTATIONS		
5. BLINDNESS			38. INFLAMMATION OR CLOTS OF VEINS (PHLEBITIS)			69. BACK PAIN OR INJURY		
6. BLURRED VISION			39. LEG CRAMPS AT REST OR EXERCISE			70. RUPTURED OR SLIPPED DISC		
7. GLASSES						71. NEURITIS OR RHEUMATISM		
8. GLAUCOMA			40. WEIGHT CHANGE			72. NUMBNESS OR WEAKNESS		
9. CATARACT			41. NAUSEA OR VOMITING			73. INDUSTRIAL DERMATITIS		
10. CONTACT LENSES			42. VOMITING OF BLOOD			74. ECZEMA, HIVES, FUNGUS, RASHES		
11. INJURIES, DEFECTS, OPERATION ON EYES			43. INDIGESTION OR HEARTBURN			75. PILONIDAL OR OTHER CYSTS		
			44. ULCER			76. GROWTH OR TUMORS		
12. PUNCTURED EAR DRUM			45. FREQUENT OR SEVERE PAIN IN ABDOMEN			77. ULCERS OF SKIN		
13. INFECTION OF EARS						78. DISCOLORATIONS, TATTOOS, BIRTHMARKS, SCARS		
14. RINGING OF EARS			46. DIARRHEA					
15. DISCHARGE OR DRAINAGE OF EARS			47. CONSTIPATION			79. DIABETES		
16. LOSS OF HEARING			48. COLITIS			80. GOUT		
17. FREQUENT COLDS			49. BLOOD IN BOWEL MOVEMENT			81. STROKE		
18. SINUS TROUBLE			50. GALLBLADDER TROUBLE			82. EPILEPSY		
19. HOARSENESS			51. YELLOW JAUNDICE			83. RHEUMATIC FEVER		
20. GOITER			52. PILES OR HEMORRHOIDS			84. SCARLET FEVER		
21. ENLARGED GLANDS OF NECK			53. INFECTION OF KIDNEY OR BLADDER			85. MALARIA		
22. STIFFNESS OR NEURITIS - NECK						86. NERVOUS BREAKDOWN		
23. PAIN OR PRESSURE OF CHEST			54. INFECTION OF PROSTATE OR TESTICLES			87. FEAR OF HEIGHTS OR CONFINED AREA		
24. SHORTNESS OF BREATH								
25. HAVE YOU COUGHED BLOOD			55. KIDNEY STONES			88. HERNIA OR RUPTURE		
26. HAVE HOU HAD FREQUENT BRONCHITIS			56. BLOODY URINE			89. ALLERGIES (MEDICATION, HAY FEVER, ASTHMA, FOOD, CONTACT, OTHER)		
			57. URINATION DURING NIGHT					
27. OTHER CHRONIC COUGH			58. LOSS OF BLADDER CONTROL					
28. WHEEZING			59. TROUBLE PASSING URINE			90. ILLNESS OR INJURIES NOT LISTED ABOVE		
29. PNEUMONIA			60. VENEREAL DISEASE					
30. TUBERCULOSIS			61. SWOLLEN, STIFF OR PAINFUL JOINTS			(FOLLOWING FOR WOMEN ONLY)		
31. PALPITATION OR POUNDING HEART						91. BEEN PREGNANT		
			62. PAINFUL ELBOW			92. HAD VAGINAL DISCHARGE		
32. HEART ATTACK			63. PAINFUL OR TRICK SHOULDER			93. TREATED FOR FEMALE DISORDERS		
33. HIGH BLOOD PRESSURE			64. LOCK OR TRICK KNEE			94. HAD PAINFUL PERIODS		
						95. NUMBER OF PREGNANCIES		
						96. NUMBER OF MISCARRIAGES		
						97. INTERVAL BETWEEN PERIODS		
						98. DURATION OF PERIODS		
						99. DATE OF LAST PERIOD		

IF "YES", LIST NUMBER AND GIVE DETAILS.

SECTION IV.

Check only those items which describe how you are probably thought of by people for and with whom you work.

☐ TOO CONSCIENTIOUS ☐ VERY MOODY ☐ OVER SENSITIVE ☐ A WORRIER ☐ EMOTIONAL

☐ ALWAYS DEPENDABLE ☐ SHY AND RESERVED ☐ SUPERIOR ☐ OVERLY SERIOUS ☐ EASILY HURT

Check items below which apply to feelings you often experience:

☐ LONELY ☐ UNHAPPY OR BLUE ☐ MISUNDERSTOOD ☐ PICKED ON ☐ FRIGHTENED

☐ RESENTFUL ☐ NEGLECTED ☐ CRITICAL OF OTHERS ☐ SLIGHTED ☐ RESTLESS

☐ UNAPPRECIATED ☐ AGITATED ☐ INADEQUATE ☐ INFERIOR

SECTION V.

	YES	NO
1. HAVE YOU EVER BEEN A PATIENT IN A HOSPITAL OR SANITORIUM?		
2. HAVE YOU EVER HAD OR BEEN ADVISED TO HAVE AN OPERATION?		
3. HAVE YOU ANY PHYSICAL COMPLAINTS OR DISABILITIES AT THE PRESENT?		
4. ARE YOU TAKING ANY MEDICINE NOW?		
5. HAVE YOU ANY CONDITION REQUIRING A SPECIAL WORK ASSIGNMENT IF YOU ARE HIRED?		
6. HAVE YOU EVER CONSULTED OR BEEN TREATED BY CLINICS, PHYSICIANS, HEALERS OR OTHER PRACTITIONERS WITHIN THE PAST 5 YEARS OTHER THAN AS NOTED ABOVE?		

IF "YES", LIST NUMBER AND GIVE DETAILS. ALSO, GIVE THE NAME AND ADDRESS OF ALL PHYSICIANS WHO HAVE EXAMINED OR TREATED YOU IN THE PAST FIVE YEARS.

	YES	NO
7. DO YOU OR HAVE YOU EVER SMOKED?		

IF "YES", INDICATE THE TYPE OF SMOKING:

___ CIGARETTES ___ NO. PER DAY ___ NO. YEARS SMOKED

___ CIGARS ___ NO. PER DAY ___ NO. YEARS SMOKED

___ PIPE ___ NO. PER DAY ___ NO. YEARS SMOKED

	YES	NO
DO YOU SMOKE NOW?		
8. DO YOU DRINK ALCOHOLIC BEVERAGES?		

IF YES, HOW MUCH IN A DAY: ___ GLASSES OF BEER ___ OUNCES OF LIQUOR ___ OUNCES OF WINE

	YES	NO
9. DO YOU HAVE ANY ADDITIONS TO MAKE TO HEALTH, HISTORY OR ANY PROBLEMS YOU WOULD LIKE TO DISCUSS WITH THE DOCTOR?		

10. WOULD YOU SAY YOUR PRESENT HEALTH IS: ☐ EXCELLENT ☐ GOOD ☐ FAIR ☐ OTHER ___

I certify that the above answers are true and complete, and I am aware that any material omission or falsification is reason for discharge. I further agree to take any examination the Company deems necessary. I authorize any of the doctors, hospitals or clinics mentioned above to furnish PPG Industries, Inc. with a complete transcript of my medical record for purposes of processing my application for this employment.

TYPED OR PRINTED NAME OF EXAMINEE ___ SIGNATURE ___

SECTION VI.

EXAMINING PHYSICIAN'S NOTES - (Thoroughly explore patient's history and comment here on all positive findings)

SECTION	ITEM	

TYPED OR PRINTED NAME OF PHYSICIAN OR EXAMINER ___ DATE ___ SIGNATURE ___

SECITON VII.

PHYSICAL EXAMINATION - Please Print All Entries

1. HEIGHT	2. WEIGHT	3. FRAME ☐ S ☐ M ☐ L	4. TEMPERATURE	5. RESPIRATION	6. PULSE	7. BLOOD PRESSURE (IF ELEVATED, CHECK AFTER 5 MINUTES RECUMBENCY)
						___ INITIAL ___ RECUMBENT

8. VISION:

DISTANT VISION WITHOUT GLASSES: R ___ L ___ WITH GLASSES: R ___ L ___

NEAR VISION WITHOUT GLASSES: R ___ L ___ WITH GLASSES: R ___ L ___

DEPTH PERCEPTION: NORMAL ___ SEE REPORT ___ NOT TESTED ___ MUSCLE BAL.: NORMAL ___ SEE REPORT ___ NOT TESTED ___

COLOR VISION: NORMAL ___ SEE REPORT ___ NOT TESTED ___ VISUAL FIELD: NORMAL ___ SEE REPORT ___ NOT TESTED ___

9. HEARING:

HEARING VOICE: WHISPERED: R ___ L ___ AUDIOMETRY: NORMAL ___ SEE REPORT ___ WEARS HEARING AID ___

SPOKEN: R ___ L ___

VIII.

If no abnormality, leave blank; if abnormal, mark "YES" and amplify on next page; If not examined, mark "NE".

1. SKIN		7. MOVEMENTS		13. DENTAL HYGIENE		19. BREASTS	
2. HAIR		8. FUNDI		14. THROAT		20. HEART	
3. LYMPH NODES		9. TENSION		15. NECK		21. PERIPHERAL ARTERIES	
HEAD		10. EARS		16. THYROID		22. PERIPHERAL VEINS	
[illegible]		11. NOSE		17. TRACHEA		23. LUNGS	
[illegible]ION		12. MOUTH		18. THORAX		24. ABDOMEN	

SECTION VIII Continued

25. HERNIA		35. INTELLIGENCE		39. BACK EXAMINATION		I. ODER'S TEST	
26. GENITALIA		36. EMOTIONAL STATUS		A. POSTURE		J. NACHLAS TEST	
27. RECTAL		37. GENERAL APPEAR.		B. FLEXION		K. YEOMAN'S TEST	
28. ARMS		38. HYGIENE		C. EXTENSION		L. PASSIVE HYPEREXTENSION	
29. HANDS				D. TORSION			
30. LEGS				E. FULL KNEE BEND			
31. FEET				F. MC BRIDE TEST			
32. SPINE				G. STRAIGHT LEG			
33. CRANIAL NERVES				RAISING			
34. REFLEXES				H. PATRICK'S TEST			

DESCRIBE ABNORMAL AND/OR SIGNIFICANT EXAMINATION FINDINGS NOTED IN SECTION VIII.

ITEM	

SECTION IX.

Urinalysis is required; other examinations will not be done without permission of Company Management.

1. URINALYSIS: ____ ALB ____ SUG	6. PULMONARY FUNCTION TEST: ☐ NORMAL ☐ SEE REPORT
2. BLOOD COUNT: ☐ NORMAL ☐ SEE REPORT	7. ELECTROCARDIOGRAM: ☐ NORMAL ☐ SEE REPORT
3. SEROLOGY: ☐ NORMAL ☐ SEE REPORT	8. OTHER X-RAY OR LABORATORY FINDINGS:
4. CHEST X-RAY: ☐ NORMAL ☐ SEE REPORT	
5. BACK X-RAY: ☐ NORMAL ☐ SEE REPORT	

IMMUNIZATIONS: (Record Year) SMALLPOX ______ POLIOMYELITIS ______ PARATYPHOID ______ YELLOW FEVER ______

TETANUS ______ DIPHTHERIA ______ TYPHOID ______ OTHER ______

SECTION X.

SUMMARY OF DISQUALIFYING CONDITIONS FOUND

SECT. XI.

MEDICAL CLASSIFICATION - This section is to be completed only by a designated PPG physician. The basis for classification will be the PPG Medical Manual

1. CHECK APPROPRIATE MEDICAL CLASSIFICATION: ☐ A ☐ B ☐ C ☐ D

2. IF CLASS "C" IS RECLASSIFIED, INDICATE:

DATE OF REEVALUATION NEW CLASSIFICATION

EXAMINING PHYSICIAN	DATE	SIGNATURE
TYPED OR PRINTED NAME		

CLASSIFYING PHYSICIAN (IF OTHER THAN ABOVE)	DATE	SIGNATURE
TYPED OR PRINTED NAME		

PPG INDUSTRIES

AUDIOMETRIC EXAMINATION

IMPORTANT: *This examination should not be done sooner than fifteen hours after the last exposure to an in-plant area designated as noise hazardous or a significant off-the-job noise exposure. Only audiometers calibrated to meet ASA (USASI) Standards will be used.*

1. NAME | BADGE NUMBER | AGE

2. PURPOSE OF EXAMINATION
☐ PRE-EMPLOYMENT ☐ ANNUAL PERIODIC ☐ OTHER ____

3. DATE OF PRESENT AUDIOMETRIC EXAMINATION | DATE OF LAST AUDIOMETRIC EXAMINATION

4. NOISE EXPOSURE INFORMATION

A. IS EMPLOYEE PRESENTLY WORKING IN A NOISE HAZARDOUS AREA? ☐ YES ☐ NO

B. ANSWER THE FOLLOWING ONLY IF THE ANSWER TO 4A IS YES:

(1) THE NUMBER OF HOURS SINCE LAST EXPOSURE TO HAZARDOUS NOISE ____

(2) dBA EXPOSURE ☐

(3) MONTHS' OR YEARS' EXPOSURE WITH AND WITHOUT EAR PROTECTION TO ABOUT THE SAME NOISE LEVEL (SHOW DATES):

WITH EAR PROTECTION ____ WITHOUT EAR PROTECTION ____

(4) TRADE NAME OF EAR PROTECTOR USED ____

5. RECORD RESULTS OF PRESENT HEARING TEST

FREQUENCIES (CPS)

	500	1000	2000	3000	4000	6000
RIGHT EAR						
LEFT EAR						

6. DETERMINATION OF MEDICAL QUALIFICATION FOR EMPLOYMENT TO WORK IN A NOISE HAZARDOUS AREA.
FROM 5 ABOVE, DETERMINE THE ARITHMETIC AVERAGE OF THE VALUES FOR EACH EAR FOR THE FOLLOWING THREE FREQUENCIES: 500, 1000 AND 2000 CPS. AND RECORD BELOW:

ARITHMETIC AVERAGE OF 500, 1000 AND 2000 CPS.

RIGHT EAR	
LEFT EAR	

A. FOR AN APPLICANT FOR EMPLOYMENT.
TO DETERMINE THE CLASSIFICATION IN REGARD TO EMPLOYMENT, REFER TO PARAGRAPH C. EARS. OF SECTION II "STANDARDS FOR MEDICAL CLASSIFICATION OF APPLICANTS FOR EMPLOYMENT."

CHECK ONE: ☐ A ☐ B ☐ C ☐ D

B. FOR EMPLOYEE TO CONTINUE TO WORK IN A NOISE HAZARDOUS AREA.
IF THE LOSS OF HEARING IN THE BETTER EAR AS RECORDED ABOVE FOR ARITHMETIC AVERAGE OF THE 500, 1000 AND 2000 FREQUENCIES IS GREATER THAN 15 DECIBELS, THE EMPLOYEE IS NOT MEDICALLY QUALIFIED TO WORK IN A NOISE HAZARDOUS AREA.

CHECK ONE: ☐ QUALIFIED ☐ NOT QUALIFIED

FORM 7915

(OVER)

7. DETERMINATION OF ADEQUACY OF PROTECTION AGAINST HAZARDOUS NOISE

FROM 5 ABOVE. RECORD THE VALUES FOR THE 4000 CPS. FREQUENCY FOR EACH EAR BELOW UNDER PRESENT TEST. ALSO, IF A PREVIOUS AUDIOGRAM HAS BEEN DONE, RECORD THE SAME VALUES FROM IT BELOW UNDER PREVIOUS TEST AND SHOW THE DATE OF THE PREVIOUS AUDIOGRAM. IF THE PRESENT TEST SHOWS A GREATER LOSS IN EITHER EAR THAN THE PREVIOUS TEST, SHOW THIS DIFFERENCE UNDER THRESHOLD SHIFT.

	4000 CPS VALUE		THRESHOLD SHIFT
	PRESENT TEST	PREVIOUS TEST (SHOW DATE)	
RIGHT EAR			
LEFT EAR			

IF THE HEARING LOSS AT 4000 CPS. IN EITHER EAR IS LESS THAN 40 DECIBELS AND THERE IS A RECORD OF A PREVIOUS AUDIOGRAM, COMPARE THE PRESENT HEARING LOSS WITH THAT PREVIOUSLY RECORDED AT 4000 CPS. IN EACH EAR. ANY INCREASE IN LOSS FROM THE PREVIOUS AUDIOGRAM REPRESENTS A THRESHOLD SHIFT. IF THIS THRESHOLD SHIFT IS 15 DECIBELS OR GREATER IN EITHER EAR, IT SUGGESTS THAT THE HEARING PROTECTION IS NOT ADEQUATE. THIS EMPLOYEE

A. MUST BE ADVISED OF THIS SHIFT AND THE NEED FOR MORE ADEQUATE PROTECTION;

B. REFITTED AND REINSTRUCTED IN THE PROPER USE OF HIS EAR PROTECTION;

C. RETESTED FOR EVIDENCE OF FURTHER LOSS IN SIX MONTHS.

NAME OF PERSON PERFORMING AUDIOMETRIC EXAMINATION ______________________