U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
CENTER FOR DISEASE CONTROL
NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH
CINCINNATI, OHIO 45202

HEALTH HAZARD EVALUATION DETERMINATION
REPORT NO. 74-86-269

OWENS-CORNING FIBERGLAS CORPORATION
NEWARK, OHIO

MARCH 1976

I. TOXICITY DETERMINATION

Exposures of employees to airborne concentrations of fibrous glass and dried binder dust, phenol, formaldehyde, and ammonia vapors are not believed to be toxic to employees under the conditions observed by the NIOSH Hazard Evaluation personnel during the visits of October 29-31, 1974, and June 16-18, 1975. The exposure of the paint mixing operator in the Chemical Factory to airborne free silica may pose a potential health hazard and merits further evaluation by company management.

These determinations are based upon measurements of workplace concentrations of airborne chemicals, physical inspection of process operations and control measures, private interviews with exposed employees, and a review of the current knowledge of the toxic effects of the chemicals evaluated.

II. DISTRIBUTION AND AVAILABILITY OF DETERMINATION REPORT

Copies of this Determination Report are available upon request from the Hazard Evaluation Services Branch, NIOSH, U.S. Post Office Building, Room 508, Fifth and Walnut Streets, Cincinnati, Ohio 45202. Copies have been sent to:

A. Owens-Corning Fiberglas Corporation, Newark, Ohio
B. Authorized Representative of Employees
C. U.S. Department of Labor - Region V
D. NIOSH Regional Consultant - Region V

For the purposes of informing the approximately 750 "affected employees", the employer will promptly "post" the Determination Report in prominent places near where the affected employees work for a period of 30 calendar days.

III. INTRODUCTION

Section 20(a)(6) of the Occupational Safety and Health Act of 1970, 29 U.S.C. 669(a)(6), authorizes the Secretary of Health, Education, and Welfare, following a written request by any employer or authorized

representative of employees, to determine whether any substance normally found in the place of employment has potentially toxic effects in such concentrations as used or found.

The National Institute for Occupational Safety and Health (NIOSH) received such a request from an authorized representative of employees regarding the exposure of employees to "dust, fumes, and smoke" at the Owens-Corning Fiberglas Corporation plant at Newark, Ohio.

IV. HEALTH HAZARD EVALUATION

A. Plant Process - Conditions of Use

The Newark, Ohio plant of Owens-Corning Fiberglas is the world's biggest producer of fibrous glass materials and has been producing glass fibers commercially since 1938. The main products are fibrous glass insulation materials for such items as acoustical tiles, thermal insulation, and furnace filters.

The raw ingredients for making glass are mixed in the Batch House. The "batch" is then heated in furnaces and converted into molten glass which is used to form glass fibers or glass marbles. The plant manufactures its own adhesives and chemical binders and applies these materials to the fibrous glass. The final stages of the manufacturing process usually require cutting and manual and mechanical handling of fibrous glass mats. Phenol-formaldehyde resins and polyol are also produced at the plant.

B. Evaluation Methods

1. Air Sampling

Measurement of individual workers' exposures to air contaminants was employed to a large extent in the evaluation. Individual workers' exposures were measured by having workers wear personal sampling devices consisting of a battery-powered pump and some type of collection device, such as a filter or a glass impinger, appropriate for the particular air contaminants being evaluated.

Where workers were protected inside closed booths or in areas where employees only worked occasionally, stationary area samplers were used to measure the maximum concentrations of airborne contaminants in these work areas.

Total airborne dust, generally consisting of dried binders and fibrous glass particles, was measured by drawing air at a known rate through a pre-weighed polyvinyl chloride (Gelman VM-1) filter in a closed face cassette and simply weighing the amount of collected dust.

Airborne respirable dust, also presumed to consist of dried binder residue and fibrous glass particles, was sampled by a standard method used for all types of airborne respirable dust. Air at a rate of 1.7 liters per minute was drawn through a size-selective device consisting of a 10-mm nylon cyclone to remove the non-respirable fraction of the total dust prior to collection of the respirable fraction on a pre-weighed filter for gravimetric analysis as described above for total airborne dust. Some problems with this technique, especially for measuring respirable fibrous glass dust, have been reported.[1] However, since no more reliable method was known and since the airborne dust has been reported to consist largely of dried binders in addition to fibrous glass, it was judged that the cyclone method was suitable for the purpose of this measurement.

Phenol, formaldehyde, and ammonia vapors were collected in midget impingers containing appropriate reagents. Phenol was collected in 0.1 N sodium hydroxide solution. After acidification of the solution, the phenol was analyzed by gas chromatography. Formaldehyde was collected in 1% sodium bisulfite solution and analyzed by the chromatropic acid colorimetric technique.[2] Ammonia was collected in 0.01 N sulfuric acid and analyzed by Nesslerization.

Direct-reading, colorimetric gas detector tubes were also used to measure short-term concentrations of phenol, formaldehyde, and ammonia in numerous plant areas.

Free silica dust was collected by the airborne respirable dust procedure described previously using a low-ashing polyvinyl chloride filter. Analysis of the collected free silica was performed by the colorimetric procedure extensively used by NIOSH in the past for silica determinations.[3]

2. Private Employee Interviews

During the initial survey of October 29-31, 1974, and during the follow-up visit of June 16-18, 1975, a number of employees in the various plant areas were administered a questionnaire privately by NIOSH industrial hygienists to find out if the employees felt that they might have health problems related to their work. Employees were also asked whether they had experienced any ill symptoms or irritation in the past when performing their job duties, and if so, what the symptoms were, when they occurred, and when they went away.

C. Evaluation Criteria

The following discussion describes the toxicologic effects that may occur in workers exposed to the chemical substances evaluated during

this study. The effects are described so that workers may know the symptoms and potential health consequences of excessive exposure. The effects described here depend upon a number of factors such as airborne concentrations, length of exposure, individual susceptibility, and possibly additive or synergistic effects of two or more substances in combination. If airborne concentrations of these substances are maintained below the limits listed on the following pages, it is believed that employees will suffer no adverse health effects as a result of their work exposures.

Fibrous Glass

The known pathophysiologic effects of fibrous glass were very well summarized by Rosensteel and Lucas of NIOSH and are directly quoted below.[4]

> "Fibrous glass is currently incorporated into an extremely wide range of plastic resin systems utilized in today's modern technologies. Fibrous glass fiber diameters can be varied within close tolerances during manufacture and usually range from .00012 to .004 inches depending upon the characteristics needed in the eventual application or product. This variation in diameter is important since it has been shown that fibers less than .00018 inches do not irritate human skin, while fibers with diameters greater than .00021 inches commonly do so. Apparently fine fibers lack the rigidity to penetrate the skin surface. While nearly all glass fibers, regardless of their ultimate use, are coated with various binders, lubricants or coupling agents, no component of allergic sensitization has yet been demonstrated in fibrous glass dermatitis. This is probably due to the fact that the resin systems are usually in a fully cured state prior to human exposure. Clinically, fibrous glass produces a miliarial eruption with tiny red papules. Generally, the itching is intense and is usually entirely out of proportion with the objective findings. Secondary lesions from scratching are usually evident. Fortunately, superficial infections are rarely observed. In the vast majority of employees exposed to fibrous glass, the discomfort or dermatitis is relatively mild and quickly abates as "hardening" occurs. "Hardening" to fibrous glass will occur in almost all employees who have any degree of continuous exposure. This phenomenon, however, is not seen where only an intermittent or episodic type exposure occurs. Glass fibers, once airborne, may also result in eye and upper respiratory tract irritation."

Toxicological data concerning long-term human exposure to fibrous glass is very limited and nonconclusive. Recent animal studies in which small diameter glass fibers were introduced into the pleural cavity of rats have shown these fibers to be carcinogenic. A retrospective mortality study[5] conducted by the National Institute for Occupational Safety and Health (NIOSH) among a large cohort (1448 white males) of fibrous glass production workers followed from 1940 to 1969 did not reveal any excess risk of malignant lung disease. However, this study did demonstrate a significantly increased risk of nonmalignant respiratory disease (excluding influenza and pneumonia). In addition, a case-control study of the respiratory disease cases (malignant and nonmalignant) detected during this study demonstrated an association of borderline significance between respiratory disease

and worker employment in pilot plant operations, some of which had produced small diameter glass fibers (1-3 micrometers) during the period 1941 through 1949.

In view of the findings of the NIOSH mortality study, it is recommended that exposure to airborne glass fibers be kept at an absolute minimum, especially when long term exposures are expected.

Resin Binders

The known pathophysiologic effects of dried resin binders are summarized in a publication of the American Conference of Governmental Industrial Hygienists (ACGIH).[6] Excerpts of this document are directly quoted below:

> "The glass fibers of most of the "wool" products are coated with a phenol- or urea-formaldehyde resin or a mixture of both that is cured at a high temperature during the manufacturing process.... Although the manufacturers of the phenol-formaldehyde-type resins can furnish no data based on experimental investigations of the toxicity of the cured resin for the respiratory tract, there appears to be abundant industrial experience over many years with this class of resins... It is to be noted that disease of the respiratory system from the inhalation of dust from cured phenol-formaldehyde resins has not been recorded during over more than one-half century of its widespread use... Reports by Schepers on dust composed of glass plus a plastic, plus various fillers, indicated a general pulmonary response comparable to that produced in animals by inert mineral dusts."

Therefore, after drying, or curing, the resin binders do not appear to be toxic. However, the manufacture, application, and curing of the resins may release vapors of phenol, formaldehyde, and ammonia.

Phenol

Ingestion of even small quantities of phenol may lead to nausea, vomiting, circulatory collapse, paralysis, convulsions, coma, mouth and digestive tract damage, fatal respiratory failure, or cardiac arrest. Fatal poisoning may occur by absorption of phenol through the skin. Long-term industrial contact may cause kidney and liver damage. Skin contact with phenol should be carefully avoided.[7]

"Due in part to its low volatility, phenol does not frequently constitute a serious respiratory hazard in industry." Exposure to 50 ppm has been reported to cause considerable irritation of the nose, throat, and eyes (However, 8 ppm of formaldehyde was also present.). The ACGIH believes that an airborne limit of 5 ppm is sufficiently safe to prevent systemic poisoning if skin absorption is avoided.[6]

Formaldehyde

Formaldehyde is known primarily for its irritating effects when exposure is by airborne contact. Formaldehyde is irritating to

the eyes, mucous membranes of the respiratory system, and skin.[6]

Ammonia

Inhalation of very concentrated vapors can lead to respiratory spasms and edema of the lung, which may be fatal.[7] Another effect which has been reported at unusually high concentrations is severe eye damage. More normal workroom concentrations may produce irritation of the eyes and respiratory tract. Odor and slight eye irritation are almost always detected before concentrations reach a toxic level. The odor can be detected below 5 ppm, or perhaps below even 1 ppm, although the atmosphere is not considered toxic at these levels.

Environmental Evaluation Criteria

Airborne exposure limits intended to protect the health of workers have been recommended by several sources. These limits are established at levels designed to protect workers occupationally exposed to a substance on an 8-hour per day, 40-hour per week basis over a normal working lifetime. For this investigation, the criteria used to assess the degree of health hazards to workers were selected from three sources:

a. OSHA Standards - the air contaminant standards enforced by the U.S. Department of Labor as found in Federal Register, Vol. 39, 23540-23543, June 27, 1974.

b. Threshold Limit Values (TLV's) - guidelines for airborne exposures recommended by the American Conference of Governmental Industrial Hygienists (ACGIH) for 1975.

c. NIOSH Recommended Standards - airborne exposure limits which NIOSH has recommended to OSHA for occupational health standards.

The criteria used in this investigation to assess potential health hazards from airborne exposures are listed below:

Source	Substance	8-Hour Time-Weighted Average Concentration
NIOSH Criteria Document	Ammonia	50 ppm[a]
1975 TLV	Formaldehyde	2 ppm
1975 TLV	Methylene Chloride	100 ppm
1975 TLV	Phenol	5 ppm

Source	Substance	8-Hour Time-Weighted Average Concentration
OSHA Standard	*Respirable Dust	5 mg/m^3 [b]
NIOSH Criteria Document	Silica (respirable)	0.05 mg/m^3
1975 TLV	*Total Dust	10 mg/m^3

a - parts of gas or vapor contaminant per million parts of contaminated air by volume.

b - approximate milligrams of contaminant per cubic meter of air.

* - Airborne dust was assumed to consist primarily of dried resin binders and fibrous glass particles.

D. Evaluation Results and Discussion

A brief discussion of the evaluation results and their significance are presented below. Results of environmental sampling are shown in tables 1 through 5 at the end of this report.

Chemical Factory

This area is used for the production of batches of chemical mixtures for use elsewhere in the plant and at other plants. The primary products from this area are paint formulations used to color fibrous glass products and phenol-formaldehyde resins used as binders in producing fibrous glass products. Operations involve adding components, mixing, and heating chemicals in large drum-shaped mixer/reactors. The reactor vessels are local exhaust vented so that most of the dust and fumes from additions and mixing are drawn away from the operator, into the reactor vessel, and out through the ventilation ducts. Operators are exposed to phenol, formaldehyde, and ammonia during the addition of chemicals to the reactor vessel, unloading of raw materials into storage tanks, and from leaking valves and connections. The paint mixer is also exposed to silica. There are approximately three employees per shift in this area.

Direct-reading, colorimetric gas detector tubes were used to obtain short-term measurements of airborne contaminant levels around the reactors and over the storage tanks. Using the tube for phenol, a barely perceptible change was observed on the tube after using twice the recommended number of pump strokes; this indicates a concentration definitely less than 2 ppm. No formaldehyde in the air could be detected using the tubes.

Personal exposures of employees were also measured using personal sampling equipment worn by the employees throughout the work shift. Results are given in Table 1. Airborne concentrations of phenol and formaldehyde appear well controlled.

One potential problem was found in the Chemical Factory. The time-weighted average exposure of the paint mixer to free silica was measured and found to be approximately 80 micrograms per cubic meter on June 17, 1975; the new standard for free silica which has been recommended by NIOSH[8] would limit exposure to 50 micrograms per cubic meter. It cannot be definitively concluded on the basis of a single sample on a single day that a silicosis hazard exists in this area. However, it appears that a potentially toxic exposure occurred that particular day, which if continued on a regular basis, would subject the paint mixer to an increased risk of developing chronic pulmonary disease. Further environmental evaluation of the day-to-day silica exposure of the paint mixer should be performed by the plant management. A medical evaluation of the paint mixers should also be performed and should include pulmonary function testing as well as chest x-rays.

Ammonia concentrations, as measured by detector tubes, in the work area and over storage tanks were less than 25 ppm; the allowable limit is 50 ppm.

Adhesives Factory

The primary products from this area are polyol which is sold to the urethane foam industry and adhesives used by Owens-Corning. The operations are of a batch nature similar to those previously described in the Chemical Factory. Polyol is produced by reacting a phenol-formaldehyde blend with propylene oxide. Propylene oxide is very explosive and is stored underground under vacuum; reactor vessels are inerted with a nitrogen blanket. Exposure to chemicals occurs from leaks in the system, pressure relief valve exhausts, and loading and unloading procedures.

Air samples throughout the area taken with direct-reading colorimetric gas indicator tubes failed to detect any phenol or formaldehyde in the air. Results of personal exposure monitoring are shown in Table 2; these samples also indicated that air levels were below detectable levels (detection limits are indicated in Table 2). These measurements indicate that there was no evidence of any health hazards in this area due to airborne exposure to phenol or formaldehyde on June 17, 1975; it is presumed that operations were normal that day and representative of usual conditions in the area.

Binder Factory (Oil House)

The oil house makes liquid binders for use in fiberglass wool production. The process is a batch mixing operation using the same types of equipment and tank ventilation systems as previously described in the Chemical Factory. A number of different chemicals are used, including ammonium salts, phenol-formaldehyde resins, and oil or mineral spirits. The only apparent air contaminant was ammonia which was readily detectable by its smell. Detector tube samples taken on June 17 measured approximately 18 ppm of ammonia in the downstairs general work-room air and 5 ppm in the upstairs general area; the airborne limit is 50 ppm.

The chemical operator also wore a personal sampler on June 17; the results are:

Operator	Contaminant	Sample Volume	Sampling Period	Concentration
Chemical Operator	Ammonia	282 liters	8:32 AM - 2:10 PM	5 ppm

Airborne ammonia concentrations were apparently well controlled and posed no obvious health hazards.

Wool Plant

a. Forehearth (Fiber forming area)

Molten glass is forced through small pores in platinum bushings to form glass fibers. As the fibers are falling down onto a conveyor, they are sprayed with liquid binders. High-velocity down-draft ventilation serves a dual purpose - providing local exhaust ventilation for the operators and helping to compress the fibers and binders into a compact mat. However, there is some exposure to fibrous glass and binder components including phenol, formaldehyde, and ammonia. The high negative pressure draws contaminated air from elsewhere in the building, especially from the oven curing area.

Although several employees complained of occasional temporary burning of the eyes and mucous membranes, airborne levels of phenol, formaldehyde, and ammonia, sampled both with colorimetric indicator tubes and with impingers (Table 3), were below the limits of detection of the analytical methods. This would seem to indicate that levels on June 17 were well within safe limits. High noise levels, although not measured by NIOSH, are apparent health hazards in this area.

b. Wool Forming

The wool blanket is conveyed from the forehearth area to ovens where the wool is cured (binder is dried). Smoke and fumes are emitted from the uncured wool as it enters the ovens. The chemical composition of these emissions and the thermal degradation products of phenol-formaldehyde resins could not be identified from a review of the available literature on these resin systems. It is assumed that residual free formaldehyde, phenol, and ammonia are released into vapor form during the curing process.

Airborne phenol, formaldehyde, and ammonia were measured in this area as in the forehearth area, but levels were also below the limits of detection of the analytical methods (Table 3).

Officials of the local Glass Bottle Blowers Association alleged that some employees in this area had experienced dizziness and loss of equilibrium at work. However, these officials were unable to document these alleged problems by providing names of such employees to NIOSH investigators. Furthermore, in private interviews between NIOSH industrial hygienists and area employees, no health problems other than hearing loss were mentioned by the employees.

c. Wool Packing and Wool Reconditioning (Repacking)

The majority of the employees in the Wool Plant work in the Wool Packing area. Sections of cured fiberglass wool mats are cut, processed, and stacked in this area. Employees are exposed to airborne dust which consists of dried binder particles as well as glass fibers.

The Repack area is apparently where waste and scrap glass wool are processed and packed. Housekeeping appeared to be a problem in this area, particularly during the initial NIOSH survey when dust and pieces of wool coated machines and walking surfaces.

There are presently no standards specifically developed for airborne limits of binder or fibrous glass dust. At the present time the general nuisance dust standards are still used as guidelines for control of fibrous glass levels in air. These standards are 10 mg/m^3 for total airborne dust and 5 mg/m^3 for the respirable portion of airborne dust. Airborne dust levels measured in the Wool Packing and Repack areas (shown in Table 3) were less than 1 mg/m^3 for total dust and less than 0.5 mg/m^3 for respirable dust. Thus the dust levels appeared to be well controlled.

Several employees of the Wool Packing area reported occasional irritation symptoms of a temporary nature such as skin rashes, nosebleeds, sneezing, coughing, and nose and mouth irritation. These reported symptoms are consistent with the known toxicologic effects of fibrous glass. Although such temporary irritation is well known, there is as yet no definite evidence that the inhalation of fibrous glass can result in permanent lung damage.

Filter Factory

Air filters are manufactured in this building. Batch (mixed raw ingredients for making glass) is brought into the filter factory from the Batch House. The batch is melted in a furnace to form molten glass. Molten glass flows by gravity through small bushings in continuous streams;fibers are formed by steam blowing and strong downdraft ventilation.

Binders are mixed in large tanks. The ingredients are basically the same as those used in the Binder House at the Wool Plant, and the mixing tanks are also similar. However, these tanks had no local exhaust ventilation at the time of the NIOSH visit. The only smell was a moderate to faint ammonia odor. The binders are sprayed onto the fibrous glass mat through a line of nozzles. There is no local exhaust for the binder spray, but no odor was apparent.

The sheet of fibrous glass and binder passes through curing ovens and then goes through a chopper; the sections are stacked manually at the end of the conveyor line.

Environmental sampling results are given in Table 4. This indicates that chemical vapors and airborne dust (dried binder and fibrous glass) are apparently well controlled in this area.

There is also a worker in this building who cuts strips of cardboard. Cardboard dust from this operation has reportedly caused some skin irritation in the past, although the cutting machine is equipped with two flexible local exhaust ducts. Even so, some cardboard dust inevitably deposits on the machine surface, permitting potential skin contact. The only applicable standard for cardboard dust is the 10 mg/m^3 standard for total nuisance dust; the measured airborne level measured by a personal sample was 0.1 mg/m^3. Therefore, airborne exposure appears to be no problem. Better protective clothing, showering after the work shift, and keeping the machine surface clean would dramatically reduce skin contact with the cardboard dust.

Special Refrigeration Area

Appliance insulation is fabricated in this area. Dust consisting of fibrous glass and dried binders is generated by cutting and working with rolls of cured wool from other parts of the plant. No local exhaust ventilation was provided for these operations. Employees were particularly vociferous about alleged high dust levels caused by working with "high temp wool". This wool differs considerably in the quantity of binder added to it from most of the other wools produced at the plant. Employees complained of symptoms such as headaches, sneezing, coughing, watering eyes, nosebleeds, and head stuffiness when working with high temp wool. Production of such wool is intermittent, which may explain why employees do not "harden", or acclimatize, to it. The area has also been cited by OSHA for excessive carbon monoxide levels.

Personal, gravimetric samples for total dust and respirable dust were collected in this area. The results shown in Table 5 indicate that the airborne dust levels are not excessive and that further ventilation is not necessary.

Some personal samples were collected for glass fiber evaluation. The airborne fibers were collected on filters and examined under a phase contrast microscope. These samples revealed the presence of some fibers in excess of 5 to 9 micrometers in diameter. Fibers of these diameters are known to be capable of inducing some of the skin and mucous membrane irritation symptoms which were reported by the workers. However, these irritation symptoms are generally only temporary; there is as yet no definite evidence that inhalation of fibrous glass can result in permanent lung damage.

Alloy Department

The initial visit to this department was in October 1974. Prior to the follow-up visit of June 1975, the department moved to new facilities in another part of the city. However, the process and its attendant hazards remain basically the same. The following discussion pertains to the process as it was observed in October 1974.

One of the processes involved the cleaning out of glass from platinum bushings using HF acid. The HF acid baths were contained in a hood; the door of the hood was kept closed when the bath was not in use. Workers were required to uncover the tops of the baths and insert and remove platinum bushings. During this operation the worker wore a protective transparent hood which fully enclosed his head and torso. A constant volume of excess clean air was pumped into this hood. Heavy rubber gloves were worn to protect the hands. The operation appeared to be reasonably

safe as long as proper work practices were followed and protective equipment and ventilation were well maintained.

Hydrochloric acid and nitric acid were used in a platinum purification process. The containers of acid were kept inside laboratory hoods. Air velocities at the face of the hoods ranged from 50 to 150 feet per minute as measured by an Alnor Velometer Jr. All the hoods were at least partially open. It was demonstrated that closing those hoods not in use could double or triple the face velocities on the hoods which were in use. Several employees were concerned about exposure to acid and acid fumes when carrying open containers of acid from one place to another. It appeared that the acid could be transported more safely if closed vessels were used or if the acids were piped from place to place when large quantities are used on a routine basis.

No air sampling was performed in this department. Everyone seemed to recognize that the acids were inherently hazardous to health if not handled safely and with great care. It appeared that adherence to proper work practices and maintenance of the hoods, fans, and protective equipment were necessary and sufficient to protect employees from hazardous exposures to acids.

Aerocor Area

The Aerocor area produces a variety of types of insulation such as automotive, building, appliance, duct, and air conditioner as well as uncured fibers. Two potential problems were briefly investigated - chemical fumes in the binder curing operation and the ventilation system in the binder mixing operation.

Airborne contaminant concentrations appeared to be minimal on June 17 as screened by direct-reading portable instruments such as gas detector tubes and the GCA Respirable Dust Monitor.

The tanks where binders are mixed and formulated are designed to be vented to prevent vapor egress. However, the tanks' ventilation systems did not appear to be properly maintained. Flexible hoses which were provided to vent the tanks by connection to an exhaust fan were disconnected or loose from several of the tanks, impairing the proper operation of the ventilation system. A better maintenance schedule for the ventilation system should be implemented in this area.

Bonded Mat

This is a specialized area where fiberglass mats are produced. Air contaminants were briefly inspected in this area. Fibrous

glass or any other dust in the air appeared very minimal, by visual observation. Formaldehyde levels were checked with detector tubes in areas where binder is mixed, sprayed, and cured. None was detected anywhere. Phenol levels checked by detector tubes were 1 ppm at the binder spray, none detected in the mixing or curing areas. The airborne phenol limit is 5 ppm. Ammonia levels were checked in the binder mixing room using detector tubes. The results were 8 ppm in the general room air, 5 ppm at a caustic tank, and 30 ppm at a binder mixing tank. The exposure limit is 50 ppm. Air contaminants did not appear to pose any health hazards on the day of the inspection.

Aeroflex

This department manufactures duct insulation. Airborne contaminants were briefly investigated in this department on June 17, 1975. Airborne levels of fibrous glass or any other dust appeared very minimal, by visual inspection. Phenol, formaldehyde, and ammonia vapors were measured using Drager gas detector tubes.

At the outlet of the curing oven, less than 1 ppm of phenol was detected. No ammonia or formaldehyde was detected. Between the binder spray and the entrance to the curing oven, 5 ppm of ammonia was measured; no phenol or formaldehyde was detected. In the binder room , no airborne contaminant concentrations could be detected using the detector tubes.

Exposure to airborne contaminants did not appear to pose any obvious health hazards in the Aeroflex area.

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VI. AUTHORSHIP AND ACKNOWLEDGEMENTS

Report Prepared By: Paul Roper
Regional Industrial Hygienist, NIOSH
Atlanta, Georgia

Originating Office: Jerome P. Flesch, Chief
Hazard Evaluation Services Branch, NIOSH
Cincinnati, Ohio

Acknowledgements

Environmental Evaluation: Robert Rosensteel and Beth Levy
Industrial Hygienists
Hazard Evaluation Services Branch, NIOSH
Cincinnati, Ohio

William Evans
Industrial Hygiene Services Branch, NIOSH
Cincinnati, Ohio

Laboratory Analyses: Staff, Physical and Chemical Analysis Branch
NIOSH, Cincinnati

Staff, Agricultural Research & Analytical Laboratory
Western Area Laboratory for Occupational Safety and Health
Salt Lake City, Utah

Ralph Zumwalde
Engineering Technician
Environmental Investigations Branch, DFSCI
NIOSH, Cincinnati

TABLE 1: RESULTS OF ENVIRONMENTAL SAMPLING IN THE CHEMICAL FACTORY

Owens-Corning Fiberglas Corporation
Newark, Ohio

June 17, 1975

SAMPLE NO.	OPERATOR/ LOCATION	CONTAMINANT	SAMPLE VOLUME (Liters)	SAMPLING PERIOD	CONTAMINANT CONCENTRATION	TYPE OF SAMPLE
I-1	Chemical Operator	Phenol	360	8:08 am-2:08 pm	0.1 ppm*	BZ*
I-2	Chemical Operator	Formaldehyde	355	8:05 am-2:00 pm	N.D.*	BZ
MP-74	Paint Mixer	Free SiO_2 (respirable fraction)	586	8:15 am-2:00 pm	0.079 mg/m^3*	BZ (respirable only)

* PPM means parts of vapor or gas per million parts of contaminated air by volume.

Mg/m^3 means approximate milligrams of particulate per cubic meter of air.

BZ indicates that the measured concentration represents an average contaminant concentration for the sampling period obtained by a personal, breathing-zone sampler worn by the employee.

N.D. means "none detected".

For formaldehyde, N.D. indicates that the airborne concentration, if any, was less than 0.05 mg/m^3 (or that the sampling/analytical procedure went awry.)

ENVIRONMENTAL CRITERIA: GUIDELINE LIMITS FOR AIRBORNE EXPOSURES		
Substance	Source of Criterion	8 hr. - Avg. Limit
Phenol	ACGIH TLV 1975	5 ppm
Formaldehyde	ACGIH TLV 1975	3 mg/m^3
Free Silica	NIOSH Criteria Document	0.05 mg/m^3 (respirable dust)

TABLE 2: RESULTS OF ENVIRONMENTAL TESTING IN THE ADHESIVES FACTORY

Owens-Corning Fiberglas Corporation
Newark, Ohio

June 17, 1975

SAMPLE NO.	OPERATOR/ LOCATION	CONTAMINANT	SAMPLE VOLUME (Liters)	SAMPLING PERIOD	CONTAMINANT CONCENTRATION	TYPE OF SAMPLE
I-3	Chemical Operator	Phenol	352	8:23 am-2:15pm	N.D.*	BZ*
I-4	Senior Chemical Operator	Formaldehyde	350	8:25 am-2:15pm	N.D.*	BZ
CT-1	Chemical Operator	Methylene Chloride	21.2	8:23 am-2:15pm	N.D.*	BZ

* BZ indicates that the measured concentration represents an average contaminant concentration for the sampling period obtained by a personal, breathing-zone sampler worn by the employee.

N.D. means "none detected".

For phenol, N.D. indicates that the airborne concentration, if any, was less than 0.06 mg/m^3 (milligrams per cubic meter).

For formaldehyde, N.D. indicates that the airborne concentration, if any, was less than 0.05 mg/m^3 (or that the sampling/analytical procedure went awry).

For methylene chloride, N.D. indicates that the airborne concentration, if any, was less than 0.5 mg/m^3.

ENVIRONMENTAL CRITERIA: GUIDELINE LIMITS FOR AIRBORNE EXPOSURES		
Substance	Source of Criterion	8-hr. - Average Limit
Phenol	ACGIH TLV 1975	19 mg/m^3
Formaldehyde	ACGIH TLV 1975	3 mg/m^3
Methylene Chloride	ACGIH TLV 1975	360 mg/m^3

TABLE 3: RESULTS OF ENVIRONMENTAL SAMPLING IN THE WOOL PLANT

Owens-Corning Fiberglas Corporation
Newark, Ohio

June 17-18, 1975

SAMPLE NO.	OPERATOR/ LOCATION	CONTAMINANT	SAMPLE VOLUME (Liters)	SAMPLING PERIOD	CONTAMINANT CONCENTRATION	TYPE OF SAMPLE
V-273	F-5 Roofing packing take-off	Respirable Dust	522	8:58am-2:05pm	0.11 mg/m^3*	Bz*(resp.)
V-211	C-4 Packing line	Respirable Dust	513	8:43am-1:45pm	0.04 mg/m^3	BZ(resp.)
V-163	D-5 Roller	Respirable Dust	491	8:53am-1:42pm	0.04 mg/m^3	BZ(resp.)
V-162	C-4 Selector/packer	Total Dust	517	8:49am-1:53pm	0.72 mg/m^3	BZ(total)
V-235	F-5 Roofing stacker	Total Dust	539	8:58am-2:15pm	0.74 mg/m^3	BZ(total)
V-271	Employee, Repack Area	Respirable Dust	527	9:09am-2:19pm	0.47 mg/m^3	BZ(resp.)
V-212	Bag Filler, #2 Machine, Repack Area	Total Dust	515	9:02am-2:05pm	0.12 mg/m^3	BZ(total)
V-181	Fabricator at #2 repack machine	Respirable Dust	496	9:03am-1:55pm	0.18 mg/m^3	BZ(resp.)
V-225	Operator who feed repack machines	Total Dust	517	9:06am-2:10pm	0.10 mg/m^3	BZ(total)
I-7	Entrance to curing oven, D5 line	Phenol	336	9:04am-2:40pm	N.D.*	GA*
I-8	Entrance to curing oven, D5 line	Formaldehyde	336	9:04am-2:40pm	N.D.	GA
I-9	Entrance to curing oven, D5 line	Ammonia	336	9:04am-2:40pm	N.D.	GA

SAMPLE NO.	OPERATOR/ LOCATION	CONTAMINANT	SAMPLE VOLUME (Liters)	SAMPLING PERIOD	CONTAMINANT CONCENTRATION	TY OF SAMPLE
I-10	Fiber forming, Binder spraying, D5 line	Phenol	330	9:15am-2:45pm	N.D.	GA
I-11	Fiber forming, Binder spraying, D5 line	Formaldehyde	330	9:15am-2:45pm	N.D.	GA
I-12	Exit end of oven, F-5 line	Phenol	325	9:25am-2:50pm	N.D.	GA
I-13	Exit end of oven, F-5 line	Formaldehyde	325	9:25am-2:50pm	N.D.	GA
I-14	Fiber forming, Binder spraying, F-5 line	Ammonia	319	9:33am-2:52pm	N.D.	GA
I-15	Fiber forming, Binder spraying, F-5 line	Phenol	319	9:33am-2:52pm	N.D.	GA
I-16	Fiber forming Binder spraying, F-5 line	Formaldehyde	319	9:33am-2:52pm	N.D.	GA

* Mg/m^3 means milligrams of contaminant per cubic meter of air.

BZ indicates that the measured concentration represents an average contaminant concentration for the sampling period obtained by a personal, breathing-zone sampler worn by the employee.

GA indicates that the measured concentration represents an average contaminant concentration for the sampling period obtained by a fixed sampler located in the general area of a machine or operation.

N.D. means "none detected".

For phenol, N.D. indicates that the airborne concentration, if any, was less than 0.06 mg/m^3.

For formaldehyde, N.D. indicates that the airborne concentration, if any, was less than 0.05 mg/m^3 (or that the sampling/analytical procedure went awry).

For ammonia, N.D. indicates that the airborne concentration, if any, was less than 1 mg/m^3.

ENVIRONMENTAL CRITERIA: GUIDELINE LIMITS FOR AIRBORNE EXPOSURES		
Substance	Source of Criterion	8 hr. - Avg. Limit
Respirable Dust	OSHA Standards	5 mg/m^3
Total Dust	ACGIH TLV 1975	10 mg/m^3
Phenol	ACGIH TLV 1975	19 mg/m^3
Formaldehyde	ACGIH TLV 1975	3 mg/m^3
Ammonia	NIOSH Criteria Document	36 mg/m^3

TABLE 4: RESULTS OF ENVIRONMENTAL SAMPLING IN THE FILTER FACTORY

Owens-Corning Fiberglas Corporation
Newark, Ohio

June 18, 1975

SAMPLE NO.	OPERATOR/ LOCATION	CONTAMINANT	SAMPLE VOLUME (Liters)	SAMPLING PERIOD	CONTAMINANT CONCENTRATION	TYPE OF SAMPLE
V-164	Packer, A-2 line	Total Dust	660	7:45am-2:13pm	0.11 mg/m^3*	BZ (total)*
I-17	Binder mixing Area	Ammonia	390	7:40am-2:10pm	1.5 ppm*	GA*

* Mg/m^3 means milligrams of particulate per cubic meter of air.

PPM means parts of vapor or gas per million parts of contaminated air by volume.

BZ indicates that the measured concentration represents an average contaminant concentration for the sampling period obtained by a personal, breathing-zone sampler worn by the employee.

GA indicates that the measured concentration represents an average contaminant concentration for the sampling period obtained by a fixed sampler located in the general area of a machine or operation.

ENVIRONMENTAL CRITERIA: GUIDELINE LIMITS FOR AIRBORNE EXPOSURES		
Substance	Source of Criterion	8 hr. - Avg. Limit
Total Dust	ACGIH TLV 1975	10 mg/m^3
Ammonia	NIOSH Criteria Document	50 ppm

TABLE 5: RESULTS OF ENVIRONMENTAL SAMPLING IN THE SPECIAL REFRIGERATION AREA

Owens-Corning Fiberglas Corporation
Newark, Ohio

June 17, 1975

SAMPLE NO.	OPERATOR/ LOCATION	CONTAMINANT	SAMPLE VOLUME (Liters)	SAMPLING PERIOD	CONTAMINANT CONCENTRATION	TYPE OF SAMPLE
V-264	Packer(Fabricator)	Total Dust	298	8:13am-11:07am	0.23 mg/m^3*	BZ*(total)
V-216	Packer(Fabricator)	Respirable Dust	304	8:08am-11:07am	1.12 mg/m^3	BZ (resp.)
V-183	Packer(Fabricator)	Respirable Dust	299	8:11am-11:07am	0.07 mg/m^3	BZ (resp.)

* Mg/m^3 means milligrams of particulate per cubic meter of air.

BZ indicates that the measured concentration represents an average contaminant concentration for the sampling period obtained by a personal, breathing-zone sampler worn by the employee.

ENVIRONMENTAL CRITERIA: GUIDELINE LIMITS FOR AIRBORNE EXPOSURES		
Substance	Source of Criterion	8 hr. - avg. Limit
Total Dust	ACGIH TLV 1975	10 mg/m^3
Respirable Dust	OSHA Standards	5 mg/m^3