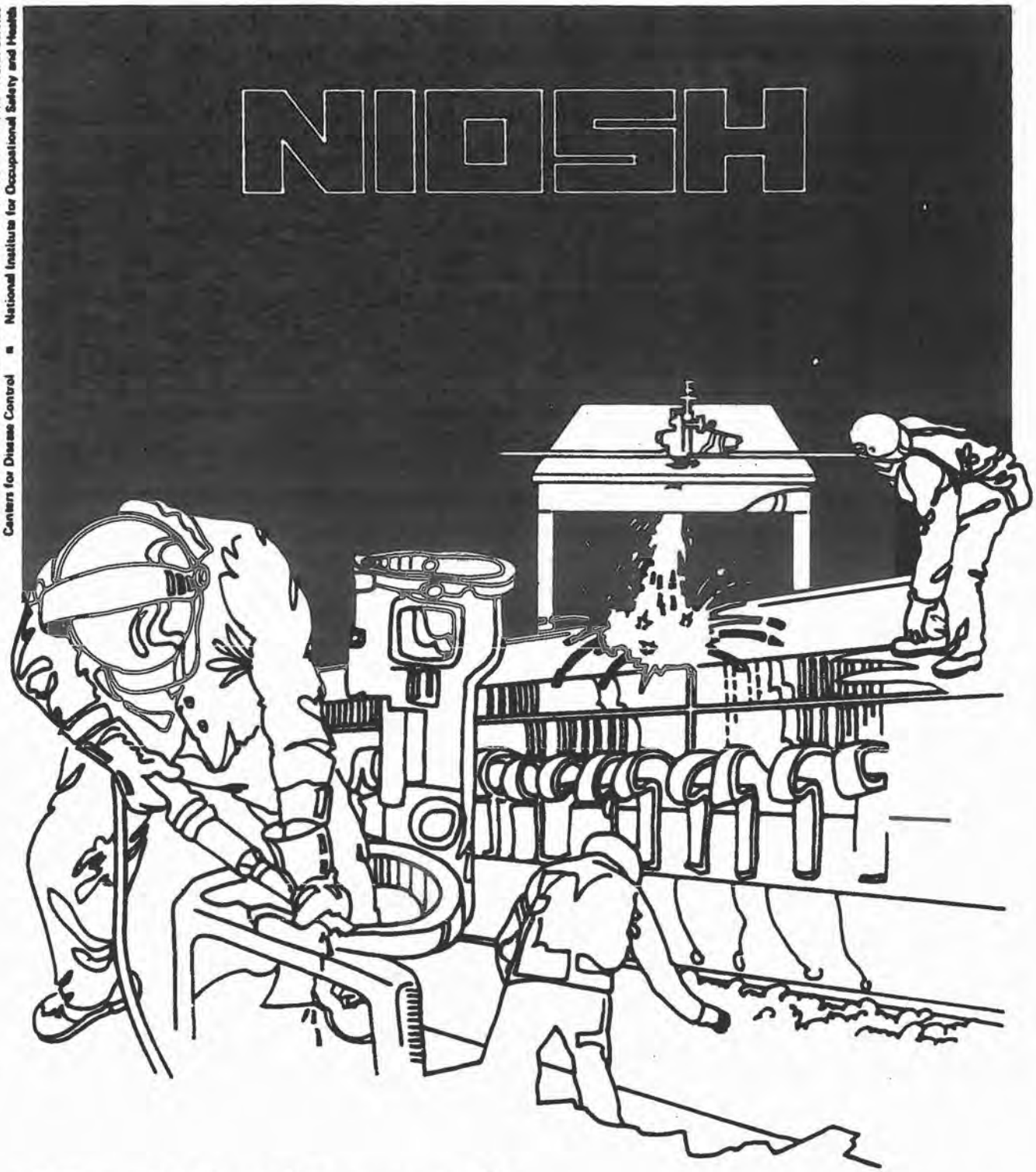
U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES ■ Public Health Service
Centers for Disease Control ■ National Institute for Occupational Safety and Health

NIOSH



Health Hazard Evaluation Report

HETA 84-151-1544
NUTURN CORPORATION
NEW CASTLE, INDIANA

PREFACE

The Hazard Evaluations and Technical Assistance Branch of NIOSH conducts field investigations of possible health hazards in the workplace. These investigations are conducted under the authority of Section 20(a)(6) of the Occupational Safety and Health Act of 1970, 29 U.S.C. 669(a)(6) which authorizes the Secretary of Health and Human Services, following a written request from 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 Hazard Evaluations and Technical Assistance Branch also provides, upon request, medical, nursing, and industrial hygiene technical and consultative assistance (TA) to Federal, state, and local agencies; labor; industry and other groups or individuals to control occupational health hazards and to prevent related trauma and disease.

HETA 84-151-1544
APRIL 1985
NUTURN CORPORATION
NEW CASTLE, INDIANA

NIOSH INVESTIGATORS:
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I. SUMMARY

In January, 1984, the National Institute for Occupational Safety and Health (NIOSH) received a request for a Health Hazard Evaluation from Nuturn Corporation in New Castle, Indiana, to evaluate workers exposures to asbestos during the manufacture of brake shoe linings. On June 6-7, 1984, NIOSH investigators conducted an environmental-medical evaluation.

Asbestos was detected in 51 personal and 1 of 3 area air samples; concentrations ranged from less than detectable limits (0.01) to 0.91 fibers/cubic centimeter (fiber/cc 8-hour time weighted average (TWA). The exposure concentrations (fibers/cc) by job classifications are as follows: preform operators 0.01-0.91, crusher operator 0.90, mixer operators 0.02-0.67, utility operators 0.09-0.41, and press cure operators 0.19-0.36. The NIOSH recommended criterion for asbestos is to reduce exposure to the lowest feasible limit. The Occupational Safety and Health Administration (OSHA) permissible exposure limit (PEL) is 2.0 fibers/cc 8-hour TWA.

Four personal breathing zone samples were collected for total particulate. Concentrations ranged between 0.8 to 25.3 milligrams per cubic meter of air (mg/m^3) 8-hour TWA. The preform operators ranged from 14.8-25.3 mg/m^3, the mixer operators ranged from 0.8-13.2 mg/m^3. The OSHA (PEL) is 15 mg/m^3.

Air concentrations of formaldehyde and phenol were below the limit of detection, 0.2 microgram per sample and 0.02 milligram per sample respectively.

Twenty of the 170 (12%) workers who performed pulmonary function tests (PFTs) had some type of abnormal test result. Twelve workers had evidence of obstructive impairment, one worker had evidence of restrictive impairment, and seven workers had evidence of both types of impairment. Two of the workers with restrictive impairment, had worked at the plant for two or less years. The other six workers had employment histories ranging from 8-38 years. Of the seven with restrictive impairment, six were obese. Of the 20 workers with abnormal PFTs, nine were current smokers, six were ex-smokers, and five were non-smokers.

Five of 170 chest x-rays were interpreted as abnormal. One of these workers had a finding suggestive of asbestos-related disease, while a second worker had evidence of pnuemoconiosis, though not the type characteristic of asbestos exposure.

Based on the environmental and medical data obtained in this investigation NIOSH investigators conclude that a health hazard to asbestos did exist at the time of this survey on June 6-7, 1984. Recommendations to aid in providing a safe and healthful working environment are presented in Section VII of this report.

KEYWORDS: SIC 3714 (motor vehicle parts and accesories), asbestos, total particulates, formaldehyde, phenol, and pulmonary function

II. INTRODUCTION

In January 1984, NIOSH received a request for a health hazard evaluation at Nuturn Corporation in New Castle, Indiana. The United Rubber Workers (URW) International Union and the URW Local No. 238 requested that NIOSH evaluate workers's exposure to asbestos during the manufacture of brake shoe linings. On March 1-2, 1984, NIOSH investigators conducted an initial walk-through survey. At this time we collected background information on the manufacturing process and the workforce. The NIOSH investigators returned to the plant during the week of June 4-8 and conducted an environmental and medical evaluation. On August 1, 1984, NIOSH conducted a follow-up survey to evaluate the ventilation system and explain the environmental sample results collected on June 4-8. Preliminary findings of the evaluations were reported in a letter of August 24, 1984, to the requestor and management.

III. BACKGROUND

Nuturn began manufacturing brake shoe linings at the New Castle facility in 1978. The plant was operated by the Firestone Company from approximately 1941-1975. In 1975 the plant was purchased by the Royal Company, which was purchased by Lear-Siegler Corporation in 1976. The plant was shut down for approximately six months prior to being purchased by Nuturn. Approximately 40% of the current workforce was employed by one of the previous owners.

In March 1984, Nuturn produced 50,000 sets (8-piece sets) of brake shoes per month. There were 135 production workers and 35 salaried workers. The workforce was approximately 60% male.

To achieve the desired friction properties, a wide variety of ingredients are commonly used in the manufacturer of brake linings. Asbestos and processed mineral fibers (PMF) are used for fiber reinforcement of the friction product. Organic binders are primarily phenolic type resins (phenol-formaldehyde) selected for high binding strength. Friction modifiers are added to achieve a desirable coefficient of friction (CF). Overall operating conditions included among these materials are zinc, brass, chashew nut oil, graphite, and oxides of iron. Fillers such as rubber scrap, barites, clays, silica, coke, coal and other minerals are used. The raw materials are unpacked, blended, weighed, pre-formed by compression, baked and further compressed before final processing.

At the time of the NIOSH survey, Nuturn had a medical program which consisted of a pre-placement chest X-ray, pulmonary function test (PFT), audiogram, medical history, and physical examination. Annual medical examinations included chest X-rays, PFTs, and audiometry (for those workers in areas where noise levels exceeded 85 db). A chest X-ray was offered to workers at termination of employment. The medical testing was conducted by at least three different contractors over the past six years. The plant health and safety technician conducted annual PFTs, using a Breon 2400 spirometer, between 1981 and 1983. The plant has a union-management health and safety committee which meets once a month "when possible".

IV. EVALUATION DESIGN AND METHODS

A Environmental

Personal and area samples for airborne asbestos were collected on mixed cellulose ester membrane filters, mounted in open-faced cassettes using a battery-powered vacuum pump operating at a flow rate at 1.7 liters per minute (lpm). The samples were analyzed using phase contrast microscopy according to NIOSH method P & Cam 239.[1]

Personal air samples for total particulate were collected on preweighed m-5 pvc filters using a battery-powered vacuum pump at a flow rate 1.7 lpm. The total weight of each sample was determined by weighing the sample plus the filter on an electrobalance and subtracting the previously determined the tare weight of the filter. The tare and gross weighings are done in duplicate.

Personal and area air samples were collected for formaldehyde on "Supelco Orbo 22" sorbent tubes. The samples were drawn at a flow rate of 0.05 liters per minute, analysis was by gas chromatography using NIOSH method 354.[2]

Personal and area air samples for phenol were collected through midget bubblers containing 15 ml of 0.1 N sodium hydroxide. The samples were collected at a flow rate of 1.0 lpm and analyzed by gas chromatography using NIOSH method S-330.[3]

B. Medical

In April 1984, a medical contractor employed at the company conducted PFTs and chest X-rays amoung 32 of the 35 salaried and 130 of the 135 hourly employees. PFTs were performed using a Puritan-Bennet Spirometer. Chest X-rays were reviewed by a B-reader (a physician trained and certified in interpreting X-rays for pneumoconiosis) who works for the private contractor. On June 6-7, A NIOSH medical investigator reviewed the aggregate test results from this survey and the medical records of all workers identified as having abnormal chest X-rays or PFTs.

V. EVALUATION CRITERIA

A. Environmental Criteria

As a guide to the evaluation of the hazards posed by workplace exposures, NIOSH field staff employ environmental evaluation criteria for assessment of a number of chemical and physical agents. These criteria are intended to suggest levels of exposure to which most workers may be exposed up to 10 hours per day, 40 hours per week for a working lifetime without experiencing adverse health effects. It is, however, important to note that not all workers will be protected from adverse health effects if their exposures are maintained below these levels. A small percentage may experience adverse health effects because of individual susceptibility, a pre-existing medical condition, and/or a hypersensitivity (allergy).

In addition, some hazardous substances may act in combination with other workplace exposures, the general environment, or with medications or personal habits of the worker to produce health effects even if the occupational exposures are controlled at the level set by the evaluation criterion. These combined effects are often not considered in the evaluation criteria. Also, some substances are absorbed by direct contact with the skin and mucous membranes, and thus potentially increase the overall exposure. Finally, evaluation criteria may change over the years as new information on the toxic effects of an agent become available.

The primary sources of environmental evaluation criteria for the workplace are: 1) NIOSH Criteria Documents and recommendations, 2) the American Conference of Governmental Industrial Hygienists' (ACGIH) Threshold Limit Values (TLV's), and 3) the U.S. Department of Labor (OSHA) occupational health standards. Often, the NIOSH recommendations and ACGIH TLV's are lower than the corresponding OSHA standards. Both NIOSH recommendations and ACGIH TLV's usually are based on more recent information than are the OSHA standards. The OSHA standards also may be required to take into account the feasibility of controlling exposures in various industries where the agents are used; the NIOSH-recommended standards, by contrast, are based primarily on concerns relating to the prevention of occupational disease. In evaluating the exposure levels and the recommendations for reducing these levels found in this report, it should be noted that industry is legally required to meet only those levels specified by an OSHA standard.

A time-weighted average (TWA) exposure refers to the average airborne concentration of a substance during a normal 8- to 10-hour workday. Some substances have recommended short-term exposure limits or ceiling values which are intended to supplement the TWA where there are recognized toxic effects from high short-term exposures.

1. Asbestos

Asbestos has been widely used in building material for fireproofing, thermal and acoustical insulation and decoration. The potential for release of fibers from these materials depends in part upon the characteristics of material that contains the asbestos fibers. Soft, crumbly materials tend to release fibers more easily than do hard, cementitious materials. The soft, crumbly material is defined as friable; material that when dry may be crumbled, pulverized or reduce to powder by hand pressure. Asbestos fibers are extremely durable, and their size and shape permit them to remain airborne for long periods of time. Fibers become suspended in the air by disturbance of the friable asbestos-containing materials or deterioration causing the material to release fibers, and by resuspension of previously released fibers that have settled onto floors and other surfaces.

Inhalation of asbestos dust can result in serious and irreversible diseases. It has been causally associated with lung cancer, a rare cancer of the chest and abdominal lining called mesothelioma and cancers of the esophagus, stomach, colon and other organs.[4]

Inhalation also causes asbestosis, a non-malignant, progressive, irreversible lung disease caused by the inhalation of asbestos dust.[5]

Asbestosis is a chronic disease of the lung, characterized by fibrosis (scarring) of the lung tissue. The initial symptom of asbestosis is shortness of breath on exertion, often accompained by a dry cough. Radiographic changes are often the first clinical findings in asbestosis and may be present in a person with normal pulmonary function. Less commonly, decrements in pulmonary abnormalities (FVC) are associated with asbestosis, other pneumoconioses, and connective tissue diseases. Obstructive impairment (FEV_1 or FEV_1 FVC) can be associated with intense, short-term asbestos exposure, but is most commonly due to the effects of cigarette smoking.[6]

There is typically a period of many years between initial exposure and the appearance of asbestos related disease. Available data show that the lower the exposure, the lower the risk of developing asbestosis and cancer. Excessive cancer risks, however, have been demonstrated at all fiber concentrations studied to date. Evaluation of all available human data provides no evidence for a threshold or "safe" level of asbestos exposure.[5] Since asbestos is a carcinogen, NIOSH policy is to reduce to the lowest feasible limit. The OSHA standard is 2.0 fibers/cc 8-hour TWA.

2. Total Particulate

In contrast to fibrogenic dust which, when inhaled in excessive amounts, cause scar tissue to be formed in the lungs, so called "nuisance" dusts are stated to have little adverse effects on lungs and do not produce significant organic disease or toxic effects when exposures are kept under reasonable control. The "nuisace" dusts have also been called (biologically) "inert" dusts, but the latter term is inappropriate to the extent that there is no dust which does not evoke some cellular response in the lungs when inhaled in sufficient amount. However, the lung tissue reaction caused by ihalation of "nuisance dusts" has the following characteristics: 1) the architecture of the air spaces remains intact; 2) collagen (scar tissue) is not form to a significant extent; and 3) the tissue reaction is potentially reversible.

Excessive concentrations of dusts in the workroom air may seriously reduce visibility, may cause irritation of the eyes, ears, and nasal passages; or cause injury to the skin or mucous membranes by chemical or mechanical action per se, or by the rigerous skin cleansing procedures necessary for their removal.[7] The American Conference of Governmental Industrial Hygienist (ACGIH) Threshold Limit Value (TLV) for total particulates is 10 mg/m^3. The OSHA (PEL) is 15 mg/m^3. NIOSH has no recommended standard.

Formaldehyde

Formaldehyde gas may cause severe irritation to the mucuous membranes of the respiratory tract and eyes. The aqueous solution splashed in the eyes may cause eye burns. Urticaria has been reported following inhalation of gas. Repeated exposure to formaldehyde may cause dermatitis either from irritation or allergy.

Systemic intoxication is inlikely to occur since intense irritation of upper respiratory passages compels workers to leave areas of exposure. If workers do inhale high concentrations of formaldehyde, coughing, difficulty in breathing and pulmonary edema may occur. Formaldehyde has induced a rare form of nasal cancer in two test animal species as reported in a study by the Chemical Industry Institute of Toxicology. Formaldehyde has also been shown to be a mutagen in several systems.[8,9]

In 1976, NIOSH recommended that occupational exposure to formaldehyde be limited to a concentration of 1 ppm for any 30 minute sampling period.[10] This recommendation, however, was based solely on the irritant effects of formaldehyde. In 1979, evidence for the carcinogenic potential fo formaldehyde became known and in 1980, NIOSH issued a new criteria which considered formaldehyde as a potential occupational carcinogen and recommended formaldehyde as a potential occupational carcinogen and recommended that exposures be reduced to the lowest feasible level.[9]

ACGIH[7], in its notice of intended changes for 1983-84, has proposed that exposure to formaldehyde be limited to a ceiling level of 1 ppm (1.5 mg/m^3).
The federal OSHA[11] standard for exposure to formaldehyde is an 8-hour TWA of 3 ppm, a ceiling level of 5 ppm, and an acceptable maximum peak above the ceiling level of 10 ppm for no more than a total of 30 minutes during an 8-hour workshift. This criteria is based on the irritant effects of formaldehyde rather than its potential carcinogenicity.

Phenol

Phenol is an irritant of the eyes, mucous membranes, and skin. Systemic absorption causes convulsions, as well as liver and kidney damage. Routes of exposure are skin absorption, ingestion, and inhalation. The skin may be the main route of entry.

Skin absorption can occur at low vapor concentrations, apparently without discomfort. Signs and symptoms can develop rapidly with serious consequence, including shock, tremor, muscle twitching, convulsions, cyanosis, coma, and death. Phenol vapors cause marked irritaition of eyes, nose, and throat. Solutions of phenol have a marked corrosive action on tissue, similar to cresol.[12]

Phenol has been shown to be a weak skin carcinogen in mice.[13,14] Conditions of these experiments, however, do not reflect industrial experiences with phenol. Results of these studies suggest that phenol functions primarily as a nonspecific irritant and may be capable of promoting tumors. To date, there is no evidence that phenol acts as a specific carcinogen or mutagen at low concentrations within normal physiologic limits. [12]

VI. RESULTS AND DISCUSSION

A. Environmental

Results of the air samples collected for asbestos are presented in Table I. Asbestos was detected in 51 personal and 1 area sample; concentrations ranged from less than detectable limits <0.01 to 1.05 fibers/cc 8-hour TWA. Since asbestos is a carcinogen, NIOSH recommends exposure be reduced to the lowest feasible limit. The OSHA standard is 2.0 fibers/cc 8-hour TWA. The personal breathing zone sample collected for asbestos on the automatic stamping operator was 1.05 fibers/cc 8-hour TWA. The high concentration can be attributed to the malfunction of the ventilation on the automatic stamping machine the day the sample was collected. The personal breathing zone sample collected for asbestos on the crusher operator was 0.90 fibers/cc. Four personal air samples collected for asbestos on the mixer operators ranged from 0.02-0.67 fibers/cc with a mean of 0.32 fibers/cc. The utility operators (4 personal samples) ranged from 0.09-0.41 fibers/cc with a mean of 0.26 fibers/cc. The preform operators (12 personal samples) ranged from 0.01-0.91 fibers/cc with a mean of 0.29 fibers/cc and the press cure operators (3 personal samples) ranged from 0.19-0.36 fibers/cc with a mean of 0.27 fibers/cc. These concentrations of asbestos exposure is mainly due to inadequate ventilation and poor work practices. However, these concentrations will vary from day to day depending on asbestos and/or processed mineral fibers used for fiber reinforcement of the friction product.

Results of the air samples collected for total particulate, formaldehyde and phenol are presented in Table II. Two personal breathing zone air samples collected on the manual preform operator ranged from 14.8 to 253 mg/m^3 with a mean of 20.1. The mixer operator (2 personal samples) ranged form 0.8 to 13.2 mg/m^3 with a mean of 7.0 mg/m^3. By comparison the ACGIH (TLV) for total particulates is 10 mg/mm^3. The OSHA (PEL) is 15 mg/m^3. NIOSH has no recommended standard. Air concentrations of formaldehyde and phenol were below the limit of detection.

Air flow measurements were taken at the work stations of several mixer and preform operators. The capture velocity at the ventilation source was 100-200 feet per minute (FPM), and the average velocity was less than 50 FPM at the worker's breathing zone. Smoke tube testing indicated inadequate ventilation at the source of airborne production (i.e., the mixing chute, weighing pans, and presses). This is not adequate to capture fibers that become airborne. Fiber concentrations should be measured at the sources of their production and at the breathing zone to assess the effectiveness of removing fibers from the area

B. Medical

Five of 170 chest X-rays were interpreted as abnormal by the contractor. One of these workers had a finding suggestive of asbestos-related disease, while a second worker had evidence of pneumoconiosis, though not the type characteristic of asbestos exposure. The first worker had pleural thickening along the left lateral wall, with no densities or calcified pleural plaques. This worker was a non-smoker and had restrictive and obstructive impairments on PFTs. He had worked for the former owners of Nuturn more than 25 years ago. A chest X-ray taken one year earlier was interpreted as normal. The second worker had p,q opacities (round, nodular), density 1/0 (few in number), throughout both lung fields with no pleural thickening or calcifications noted. This worker's PFT results were normal. He had worked at the plant for three and a half years and was a non-smoker. A chest X-ray taken one year earlier was interpreted as normal.

Twenty of the 170 (12%) workers who had PFTs had some type of abnormal test result. NIOSH investigators defined an abnormal PFT result as a forced vital capacity (FVC) or forced expiratory volume in one second (FEV_1) of less than 80% of predicted, or a FEV_1/FVC of less than 70% of predicted. Twelve workers had evidence of obstructive impairment, one worker had evidence of restrictive impairment, and seven workers had evidence of both types of impairment.

Two of the workers with restrictive impairment, or a combination of both, had worked at the plant for two or less years. The other six workers had employment histories ranging from 8-38 years. Of the seven workers with restrictive impairment, for whom weights and heights were available, six were obese (> 15 pounds over the upper range of their ideal weight). Obesity is known to interfere with the mechanics of lung expansion and may have contributed to these worker's abnormal results. Of the 20 workers with abnormal PFTs, nine were current smokers, six were ex-smokers, and five were non-smokers.

There was one X-ray which was suggestive of asbestosis and one suggestive of some other pneumoconiosis. However, further clinical evaluation is needed to 1) confirm these findings, and 2) consider other possible causes of the abnormalities. Restrictive pulmonary function abnormalities, in the absence of obesity, and obstructive impairment, in the absence of a history of cigarette smoking, may be associated with asbestos or other occupational dust exposure. Further clinical evaluation of these workers is necessary for the reasons stated above.

Based on the environmental and medical data obtained in this investigation NIOSH concludes that a health hazard to asbestos did exist at the time of this survey on June 6, and 7, 1984.

VII. RECOMMENDATIONS

1. Worker exposures should be reduced by a combination of engineering controls, good work practices, administrative controls, and personal protective equipment. The best control measure available would be to eliminate the use of asbestos entirely and substitute material such as PMF in its place. However, the long-term health effects of other mineral fibers are not yet known. Good housekeeping and a clean work environment are also necessary, even if asbestos were to be replaced.

2. The unloading of packaged asbestos should be done within an enclosed exhaust-ventilated area so that there is no direct contact with free airborne asbestos once the bags are open. An automatic bag unloader can be used to remove workers from the immediate vicinity where asbestos dust is generated.

3. The asbestos containing dust created in the manufacturing process should be immediately ventilated to the baghouse by use of captive hoods, booths, and enclosures. The ventilation intake should be between the asbestos containing material and the worker to prevent airborne spread to the workers' breathing zone. Intakes should also be placed beneath the asbestos to exhaust any dust which may fall to the floor. This would eliminate any hazard to someone subsequently sweeping the floor or walking through the area

4. Both personal and environmental monitoring should be performed. Personal samples should be collected from the breathing zone of the employee and should be scheduled at least once every six months. The duration of the sampling should be long enough to determine an 8-hour TWA. Affected employees should be given an opportunity to observe the monitoring and have access to the results.

5. Permanent and continuous monitoring for asbestos and other fibers would be quite valuable, because a permanent record can be kept on file, documenting continuous exposure levels at all work stations. Monitoring devices provide an objective means for assessing whether control measures are effective.

6. All external surfaces should be maintained free of accumulations of asbestos fibers. Areas should be vaccumed clean using a high efficiency particulate air filter (HEPA).

7. Periodic maintenance of the ventilation equipment should be performed to prevent malfunction. Holes in the ventilation duct should be repaired.

8. Asbestos waste, scrap, debris, bags, containers, equipment, and asbestos-contaminated clothing, consigned for disposal, should be collected and disposed of in sealed, impermeable bags or containers.

9. Areas where employees are allowed to eat or drink should be kept free of asbestos or any other toxic material.

10. Caution signs should be posted at all approaches to areas where airborne concentrations of asbestos may exceed the exposure limits. Also, cautionary labels should be affixed to all raw materials, mixtures, scrap, waste, debris, or other products containing asbestos fibers.

11. Respirators should not be used in place of environmental controls which are aimed at reducing airborne levels but, if needed, should be used in conjunction with other control measures.

12. Experience has demonstrated that respirators may be so uncomfortable that they are infrequently worn and that respirators are only partially effective, especially if used by employees with beards. Consequently, respirators cannot be considered as a front-line of defense against airborne asbestos.

13. Development of joint management-union education programs to address worker concerns and needs regarding material used, effects of contaminants in the workplace, as well as more effective use of the labor-management health and safety committee are recommended.

14. The medical monitoring program, currently in place, should be continued. While medical monitoring may detect asbestosis in its early stages, it is not an effective means of reducing mortality from asbestosis or asbestos-related cancers. The only known method for preventing these diseases is to reduce or prevent exposure to asbestos.

15. Medical examinations should be provided to any employee working in an asbestos-containing environment prior to employment and periodically thereafter. This exam should include, as a minimum, a medical history (to elicit symptoms of respiratory disease), a physical examination of the chest, a chest X-ray interpreted by a physician trained in the ILO pneumoconiosis classification system, and pulmonary function tests.

16. All workers should receive written notification of their individual medical results. Workers should keep a record of all medical results so that they too (in addition to the company) can monitor changes in respiratory function over time.

17. Any worker who is found to have an abnormal medical examination should be referred to a physician, preferably one who is experienced in the diagnosis and treatment of occupational lung disease, for further evaluation.

VIII. REFERENCES

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IX. AUTHORSHIP AND ACKNOWLEDGEMENTS

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X. DISTRIBUTION AND AVAILABILITY OF REPORT

Copies of this report are currently available upon request from NIOSH, Division of Standards Development and Technology Transfer, Publications Dissemination Section, 4676 Columbia Parkway, Cincinnati, Ohio 45226. After 90 days, the report will be available through the National Technical Information Service (NTIS), 5285 Port Royal, Springfield, Virginia 22161. Information regarding its availability through NTIS can be obtained from NIOSH Publications Office at the Cincinnati address. Copies of this report have been sent to:

1. Local 238, United Rubber Workers, New Castle, Indiana
2. United Rubber Workers International Union, Akron, Ohio
3. Nuturn Corporation, New Castle, Indiana
4. NIOSH, Region V
5. OSHA, Region V

For the purpose of informing affected employees, copies of this report shall be posted by the employer in a prominent place accessible to the employees for a period of 30 calendar days.

Table I

Results of Personal Samples for Asbestos
Nuturn Corporation
New Castle, Indiana
HE 84-151
June 6, 1984

Date	Job and/or Location	Sampling Period	Sample Volume Liters	Asbestos Concentration (Fibers/cc)
6-6-84	Mixer Operator #3	0712-1434	751	0.52
6-6-84	Mixer Operator #1	0715-1013	303	0.67
6-7-84	Mixer Operator #3	0722-1440	745	0.08
6-7-84	Mixer Operator #2	0716-1436	748	0.02
6-7-84	Area Between Mixer 2&3	0724-1436	734	0.03
6-6-84	Utility Operator (Zig-Zag)	0702-1120	439	0.09
6-6-84	Utility Operator (Zig-Zag)	0702-1442	782	0.20
6-6-84	Utility Operator (Zig-Zag)	0709-1456	726	0.33
6-7-84	Utility Operator (Zig-Zag)	0709-1456	794	0.41
6-6-84	Automatic Preform Operator	0722-1437	651	0.91
6-7-84	Automatic Preform Operator	0726-1440	668	0.13
6-6-84	Ridgeway Preform Operator	0724-1440	741	Filter Overloaded
6-6-84	Ridgeway Preform Operator	0725-1439	639	0.52
6-7-84	Ridgeway Preform Operator	0728-1442	738	0.47
6-7-84	Ridgeway Preform Operator	0729-1440	651	0.33
6-6-84	Commercial Preform Operator	0731-1438	617	0.15
6-6-84	Commercial Preform Operator	0735-1439	610	0.01
6-7-84	Commercial Preform Operator	0732-1443	656	0.18
6-7-84	Commercial Preform Operator	0733-1442	656	0.16

(Continued)

Table I
(Continued)

Date	Job and/or Location	Sampling Period	Sample Volume Liters	Asbestos Concentration (Fibers/cc
6-6-84	Snow Man Preform Operator	0746-1446	714	0.17
6-7-84	Snow Man Preform Operator	0752-1446	704	0.28
6-6-84	Manual Preform Operator	0727-0950	243	0.16
6-6-84	Press Cure Operator	0739-1445	634	0.36
6-6-84	Press Cure Operator	0741-1444	629	0.19
6-7-84	Press Cure Operator	0734-1445	655	0.27
6-6-84	Plant Service Operator	0819-1435	639	0.05
6-6-84	Plant Service Operator	0820-1433	552	0.13
6-7-84	Plant Service Operator	0719-1445	758	0.12
6-7-84	Plant Service Operator	0719-1438	694	0.09
6-6-84	Outside Grinder Operator	0759-1451	700	0.12
6-6-84	Outside Grinder Operator	0802-1457	649	0.17
6-7-84	Outside Grinder Operator	0746-1449	670	0.34
6-6-84	Inside Grinder Operator	0758-1448	697	0.14
6-6-84	Inside Grinder Operator	0800-1452	644	0.13
6-6-84	Rockwell Saw Operator	0748-1446	711	0.06
6-6-84	De Walt Saw Operator	0752-1452	714	0.03
6-6-84	Paulding Saw Operator	0754-1447	634	0.12

(Continued)

Table I
(Continued)

Date	Job and/or Location	Sampling Period	Sample Volume Liters	Asbestos Concentration (Fibers/cc)
6-6-84	Automatic Drill Operator	0804-1448	687	0.16
6-6-84	Hand Drill Operator	0806-1450	687	0.14
6-6-84	Commercial Hand Drill Operator	0823-1453	598	0.26
6-7-84	Hand Drill Operator	0748-1328	529	0.18
6-7-84	Commercial Hand Drill Operator	0750-1450	663	0.22
6-6-84	B&B New Cutter Operator	0756-1449	702	0.12
6-7-84	B&B New Cutter Operator	0740-1447	726	0.38
6-6-84	Automatic Stamping Operator	0803-1450	639	1.05
6-6-84	Hand Stamping Operator	0810-1453	627	0.09
6-6-84	Packaging Operator	0812-1451	678	0.28
6-7-84	Packaging Operator	0742-1448	672	0.16
6-7-84	Crusher Operator	0736-1445	729	0.90
6-6-84	Oven Operator	0744-1500	741	0.06
6-6-84	Commercial OD & ID Grinders Operator	0824-1315	439	0.10
6-7-84	Office (Area)	0755-1500	722	0.02
6-7-84	Cafeteria (Area)	0632-1425	804	LD*
6-7-84	Cafeteria (Area)	0632-1425	804	LD

Present OSHA Standard
2.0 f/cc - 8 hour TWA
10.0 f/cc - 15 minute ceiling

Recommended NIOSH Standard
Lowest Feasible Limit

Concentrations of asbestos are given in fibers greater than 5u in length per cubic centimeter of air (f/cc).

Limit of detection used by the laboratory was 0.03 fibers/field.

*LD - Less than detectable limits.

Table II

Results of Personal and Area Samples
for
Total Particulate, Formaldehyde, and Phenol
Nuturn Corporation
New Castle, Indiana
HE 84-151
June 6-7, 1984

Job and/or Location	Date	Sampling Period	Sample Volume Liters	Total Particulate mg/m^3*	Formalde-Hyde mg/m^3	Phenol mg/m^3
Mixer Operator #2	6-6-84	0709-1430	750	13.2	-	-
Mixer Operator #3	6-7-84	0722-1440	745	0.8	-	-
Manual Preform Operator	6-6-84	0950-1441	401	14.8	-	-
Manual Preform Operator	6-7-84	0730-1443	668	25.3	-	-
Mixer Operator #3	6-6-84	0712-1434	33.9	-	LD**	-
Area Between #2 & #3 Mixer	6-7-84	0724-1436	32.8	-	LD	-
Mixer Operator #1	6-6-84	0715-1013	12.6	-	-	-
Mixer Operator #2	6-7-84	0716-1100	13.0	-	-	LD
Area Between #2 & #3 Mixer	6-7-84	0800-1438	29.6	-	-	LD
Environmental Criteria mg/m^3				10	Lowest Feasible Level	20
Limit of Detection				0.01 mg	2.0 ug	0.02mg

*mg/m^3 = Milligrams of substance per cubic meter of air sampled.
**LD - Less than detectable limits.

DEPARTMENT OF HEALTH AND HUMAN SERVICES
PUBLIC HEALTH SERVICE
CENTERS FOR DISEASE CONTROL
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