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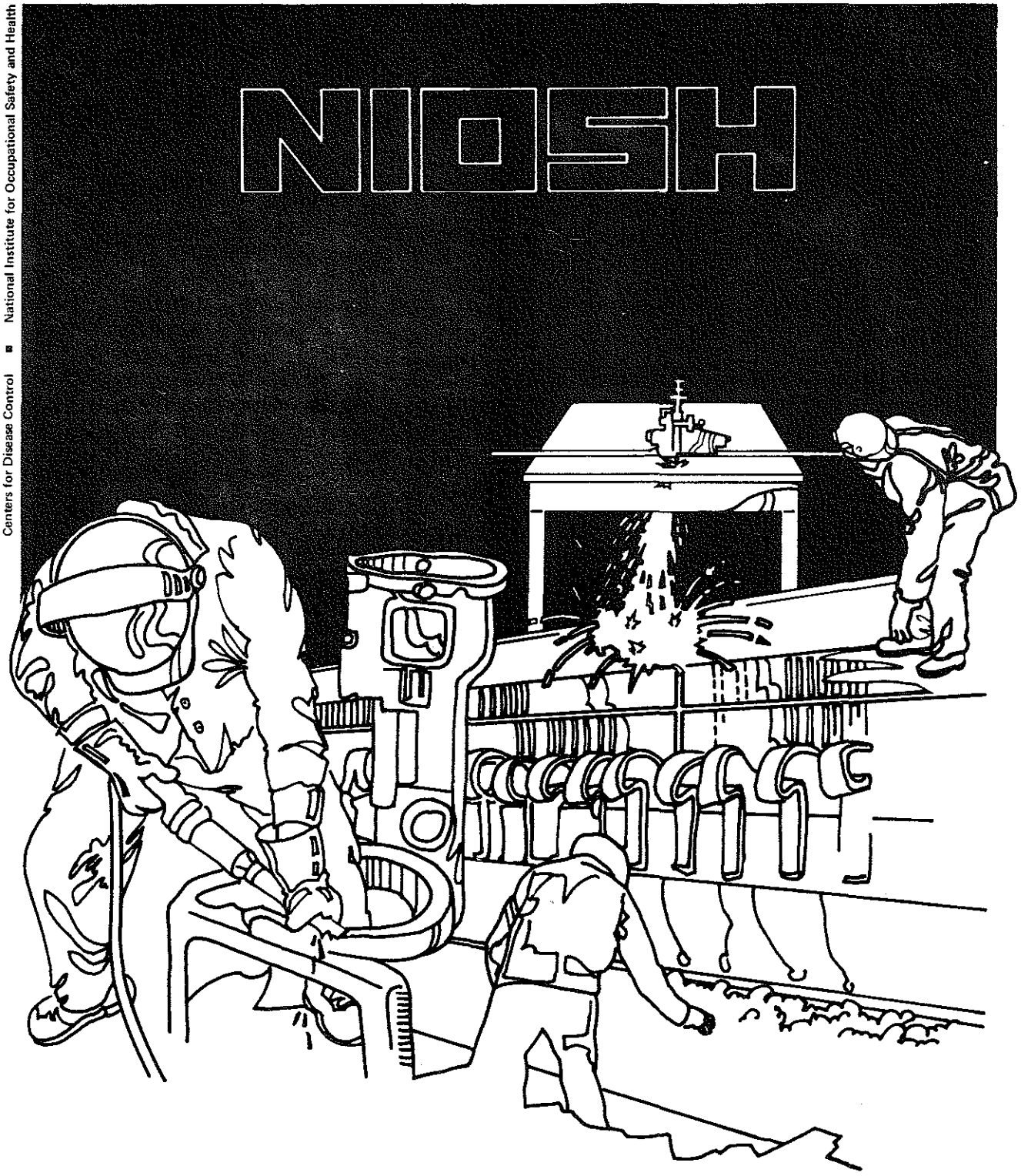
NIOSH



Health Hazard Evaluation Report

HHE 80-215-911
WILSON SPORTING GOODS COMPANY
IRONTON, OHIO

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.

HE 80-215-911
July 1981
Wilson Sporting Goods Company
Ironton, Ohio

NIOSH INVESTIGATORS:
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I. SUMMARY

On August 25 and 26, 1980, a health hazard evaluation was conducted by the National Institute for Occupational Safety and Health (NIOSH) at the Wilson Sporting Goods Company, Ironton, Ohio. The evaluation consisted of environmental sampling for solvents and ink decomposition products, a medical examination of employees for dermatitis, collection of urine samples for aniline metabolites (aromatic amines), a medical questionnaire, and an epidemiologic study of worker insurance records and death certificates to detect any increased risk of bladder cancer.

Medical results showed that 8 of 14 leather glove lacers had a history suggestive of primary irritant contact dermatitis involving the inner aspects of both forearms. Two other lacers had a history suggestive of allergic contact dermatitis. All lacers demonstrated discoloration of the palmar aspects of the hands and fingers, and most demonstrated mild to moderate cracking of the skin on the fingers.

Aromatic amines were detected in the urine of 22 of 28 Wilson workers (range 1.0 - 19.6 parts per billion [ppb]), (mean morning (AM) = 2.03 $\pm$ 1.33 ppb, afternoon (PM) = 2.86 $\pm$ 3.95 ppb). One was confirmed as resembling benzidine on thin layer chromatography. This compares with previous NIOSH non-dye exposed controls showing 8 of 23 with detectable aromatic amines in urine, with a mean = 1.6 $\pm$ 0.7 ppb, and none confirmed as benzidine on thin layer chromatography (TLC).

The risk to workers from aromatic amines in leather dyes could not be fully assessed due to the small number of exposed workers. However, a random sampling of insurance claims filed the previous two years revealed no cases of bladder cancer or excessive morbidity.

Environmental sampling results showed n-hexane (range 77-105 milligrams per cubic meter [mg/M^3]), toluene (range 68-184 mg/M^3), and petroleum naphtha vapor (range 318-624 mg/M^3) in the cementing room. Petroleum naphtha (aliphatic hydrocarbon) concentrations were above the NIOSH-recommended standard (350 mg/M^3) in two of three personal samples collected. Contaminants found during the hot stamping process were hexane, heptane, petroleum naphtha, o-cresol, and butyl carbitol. Concentrations of these contaminants did not exceed Occupational Safety and Health Administration (OSHA) standards or NIOSH recommended standards.

Based upon the results of this investigation, NIOSH determined that a hazard existed in the cementing room of exposure to excess concentrations of petroleum naphtha during basketball carcass washing, and to lacers as a result of irritant, allergic, or trama-induced dermatitis from lacing baseball gloves. Aromatic amines were found in the urine of leather workers. Recommendations to improve working conditions are contained in Section VII of this report.

KEY WORDS: (SIC 3150), Aniline dye, sporting goods, dermatitis, n-hexane, heptane, petroleum naphtha, toluene.

II. INTRODUCTION

On July 28, 1980, NIOSH received a request from the International Chemical Workers Union for a health hazard evaluation at the Wilson Sporting Goods Company, Ironton, Ohio. The health concerns were dermatitis and possibly an increased risk of bladder cancer among workers exposed to aniline dyes while lacing baseball gloves.

Although aniline has not been demonstrated to cause bladder cancer, several of the dyes made from aniline and its derivatives have been shown to be potent bladder carcinogens. The requestor wanted to know if the leather dyes could cause cancer among the lacers.

On August 25 and 26, 1980, NIOSH conducted an environmental and medical health hazard evaluation at the Wilson Sporting Goods Company. On February 13, 1981, an epidemiologic study was conducted by examining company insurance records of workers at this plant. See Interim Report No. 1 (HE 80-215, September 1980) for initial findings and recommendations.

III. BACKGROUND

A. Facilities/Personnel

The Wilson Sporting Goods Company (a subsidiary of the Pepsi Cola Corporation) has been manufacturing professional baseball gloves and basketballs in Ironton, Ohio, since 1946. There are approximately 200 employees who manufacture about 800 baseball gloves and 900 basketballs per day. There are 160 female and 40 male workers. They range in age between 18 and 67 years. The mean age is 39 years. They work only the day shift (8 AM to 5 PM), Monday through Friday. The average length of service for these employees is 10.5 years.

B. Process Description

1. Baseball Gloves:

Leather and lace for baseball gloves are received in bulk on wood pallets. The leather is inspected for quality and put on a punch press for stamping out gloves (palm, fingers, thumb, and web). Wool and polypropylene (glove padding) are also machine stamped. A hot stamping machine (Automark, operated at 450-550^{o}F) is used to hot stamp the Wilson logo into the various parts of the glove. A paste ink, which contains o-cresol, butyl carbitol, and various solvents is rolled over the hot stamp before it is burned into the leather. The fingers, thumb, palm, web, and padding are then machine sewed together. Gloves are then put over hot stretching irons (finger probes) to stretch and condition the leather. The excess leather is trimmed, and eyelets are punched into the glove palm. The gloves then go to the lacing department where the fingers, thumb, and web are hand-laced together. Petroleum lubricant is added to the palm and then hand-pounded with a bowling pin to form the glove pocket. The gloves are then inspected, packaged, and shipped.

2. Basketballs:

Wilson basketballs are made of a nylon bladder encased in a natural rubber carcass. Leather panels are glued to the carcass and pressure molded to secure the bond. Wilson receives the nylon bladder and carcass from another company. The carcasses are inflated and excess rubber is ground off with a power sander. The basketball carcasses are dipped in a solvent (n-hexane and petroleum naphtha) to clean and prepare the surface for rubber cementing. Two coats of cement (Bostik 2033 adhesive) are brushed on and the product placed on drying racks. Leather panels get three coats of cement. A group of about 24 female workers sit at a worktable and affix these panels to the basketballs. Each basketball contains eight panels. The basketballs are then put into pressure molds (100 pounds per square inch [psi]) to secure the bond. The basketballs are then inspected, boxed, and shipped.

Each step in the manufacture of baseball gloves and basketballs is performed by one or more workers. Workers are paid by piecework.

IV. METHODS

A. Industrial Hygiene and Environmental Analyses

On August 25, 1980, an opening conference was held with Wilson Sporting Goods management, NIOSH project officer, laboratory support personnel, and union representatives.

After the opening conference, the NIOSH personnel, management, and a union representative conducted a walk-through survey of the plant operations, including the basketball and baseball glove manufacturing areas. Special emphasis was placed on observing the glove lacing operation.

On August 26, 1980, NIOSH collected eight air samples to determine worker exposure to decomposition products from the hot stamping process, and for solvent exposures in the basketball carcass cleaning and cementing rooms. Ventilation measurements were taken at all work stations where cement was applied. Work practices were observed in the baseball glove lacing area, and informal employee interviews were conducted at the work stations. OSHA 200 forms from the past two years were also reviewed.

Air samples were collected using Sipin air pumps calibrated at 100 cc/minute. Sampling trains for collecting airborne contaminants were glass charcoal tubes, silica gel tubes, and AA filters. Sampling trains for ink decomposition products contained in series an AA filter, and a charcoal or silica gel tube. Airborne solvents were collected with charcoal tubes.

Altogether, three charcoal tubes, four AA filters, and one silica gel tube were collected at the Wilson Sporting Goods Company and submitted for analysis of organics, particularly decomposition products of o-cresol and butyl carbitol from the hot ink stamp machines. The sampling media were desorbed with

different solvents so that the compounds most likely to be adsorbed onto the tubes or filters were sufficiently desorbed. After desorption, all of the samples were analyzed by gas chromatography flame ionization detector (FID) using a 12-foot, 20%, SP-2100 column.

The charcoal tube samples were desorbed in 1 milliliter (mL) of carbon disulfide for detection of organic solvents. Charcoal tubes from the hot stamp machine were analyzed by Gas Chromatograph/Mass Spectrophotometer (GC/MS) for peak identification.

The four AA filters were desorbed in 2 mL of 5% methanol in methylene chloride, and analyzed by GC/MS.

The silica gel tube was desorbed in 1 mL of acetone for detection of the cresol isomers. Analysis was by gas chromatograph. Desorption efficiencies were run for all of the compounds quantitated.

B. Medical Methods

On August 26, 1980, NIOSH conducted a medical survey of Wilson Sporting Goods employees. Three groups of workers were selected to participate: (1) Lacers-the group of primary concern; (2) Machine operators-exposed to leather gloves but not to lacing leather; and (3) Others-including basketball cementers and hot stamp process workers.

The medical survey involved a general questionnaire; a detailed inquiry into the nature of any skin problem; a brief physical examination of the skin of affected workers; a photograph of affected skin; and a collection of urine, both early and late in the shift of the lacers, and once for the other participants. The urine was analyzed for evidence of exposure to aniline dyes by a screening for aromatic amines using the NIOSH Method P & CAM 315.[1]

A total of 29 workers including 14 lacers, 9 machine operators, 2 cementers, and 4 other workers agreed to participate. Among the 22 lacers present on the day of the study, 64% participated. The fifteen workers outside the lacing area participated as non-exposed controls.

C. Epidemiologic Methods

On October 24, 1980, NIOSH medical officers visited Wilson Sporting Goods headquarters, River Grove, Illinois. A meeting was held with the Director of Compensation and Benefits. To determine if any excess of deaths from any cause could be detected, copies of death certificates obtained by the company as part of an insurance plan over the 2 previous years were reviewed. The company was aware of only three deaths over that period, and no previous records were available. Further history of the Ironton facility was obtained, and NIOSH requested review of third party insurance claims filed by Ironton employees over the past 2 years. Also requested were the list of permanent totally disabled workers from the Ironton plant, and a list of current retirees. The company requested that NIOSH provide a supoena for the third party insurance claims. On October 30, 1980, NIOSH Legal Counsel served a subpoena to Wilson Sporting Goods Company for the third party insurance claims of the Ironton facility.

On February 13, 1981, the NIOSH medical officer met with company representatives of Wilson Sporting Goods Company to review the insurance records. Approximately 800 claims were filed over the past 2 years from the Ironton facility. A random sample of 80 records was pulled and diagnoses were recorded.

V. ENVIRONMENTAL CRITERIA

A. Evaluation Criteria

In this study, three sources of criteria were used to evaluate workers' exposure to toxic chemicals. These exposure limits are derived from existing human and animal data, and industrial experience, and represent values to which it is believed that nearly all workers may be exposed for an 8 to 10-hour day, 40-hour work week, over a lifetime, with no adverse effects.

The three sources of criteria for this study were: (1) Criteria for a Recommended Standard...Occupational Exposure to Hexane,[2] Heptane,[2] Refined Petroleum Solvents,[3] Toluene,[4] and Cresols,[5] by the National Institute for Occupational Safety and Health; (2) Occupational Safety and Health Standards for General Industry,[6] by the Department of Labor's Occupational Safety and Health Administration; and (3) Threshold Limit Values (TLVs) and their supporting documentation[7] by the American Conference of Governmental Industrial Hygienists (ACGIH).

NIOSH-Recommended Standards, OSHA Standards, ACGIH TLV's, and health effects information are summarized below.

Reported in Milligrams per Cubic Meter (mg/M^3)

Contaminants	NIOSH-Recommended Standards	OSHA Standards	ACGIH* TLV	Health Effects
Hexane	350	1,800	360	Irritating to skin, eyes, respiratory system, and lungs - neuropathy[1]
Heptane	348	2,045	1,600	Irritating to skin, respiratory system, lungs, and peripheral nervous system
Petroleum Naphtha	350	2,000	--	Irritating to skin, respiratory system, eyes, and central nervous system
Toluene	376	753	375	Toxic to central nervous system, liver, kidneys, and skin irritation

*TLV = Threshold Limit Value.

Contaminants	NIOSH-Recommended Standards	OSHA Standards	ACGIH* TLV	Health Effects
o-Cresol	--	22	22	Toxic to central nervous system, liver, kidneys, and skin irritation
Butyl Carbitol	--	--	--	Eye irritation and moderate skin irritant

*TLV = Threshold Limit Value

Aniline

Aniline is widely used as an intermediate in the synthesis of dyestuffs. It can be inhaled as a vapor and/or absorbed into the skin. It is mildly irritating to the eyes and may cause corneal damage. Absorption of aniline, whether from inhalation of vapor or from skin absorption of the liquid, causes anoxia (deficiency of oxygen). Moderate exposure increases the oxygen deficiency which may be associated with headaches, weakness, irritability, and drowsiness.[8]

Chronic poisoning may occur after repeated exposure to low concentrations. Early symptoms include pallor (lack of color), secondary anemia, and fatigue. Aniline, in its pure form, does not appear to cause bladder cancer in man.[9] Early observations of workers who used aniline showed an increased risk for bladder cancer.[10] However, later studies showed impurities, such as 2-naphthylamine and benzidine, in aniline-based solutions were far more important in the causation of bladder cancer.[11]

Petroleum Naphtha

The naphthas are irritating to the skin, conjunctiva, and the mucous membrane of the upper respiratory tract. Skin chapping may develop after repeated contact with this solvent. Sufficient quantities of naphtha may cause central nervous system depression. Symptoms include inebriation, followed by headache and nausea. In higher concentrations, dizziness, convulsions, and unconsciousness may result.[12]

VI. RESULTS AND DISCUSSION

A. Environmental

Hexane, heptane, petroleum naphtha, toluene, o-cresol, and butyl carbitol were the contaminants found in the NIOSH air samples. Petroleum naphtha levels exceeded the NIOSH-recommended standard of 350 mg/M^3 in two of three personal samples taken in the cementing room. One worker was exposed to 624 mg/M^3, the other at 589 mg/M^3. Both workers were overexposed while rinsing basketballs with the solvent prior to cementing. The remaining contaminants were all within NIOSH-recommended standards and OSHA standards. Sample results are shown in Tables 1 and 2.

Contaminants found during the hot stamping process were butyl carbitol, o-cresol isomer, hexane, heptane, toluene, and petroleum naphtha (aliphatic hydrocarbons). None of these contaminants exceeded OSHA standards or NIOSH-recommended standards for these compounds. However, laboratory results indicate there may have been breakthrough on charcoal tube samples 2 and 3 for petroleum naphtha. Since this product has a large molecular weight compared to other solvents mentioned above, they may have been pushed through by the petroleum naphtha, and therefore results may be under-reported.

Air levels for o-cresol were within OSHA standards. However, silica gel tubes showed a better affinity for quantifying this compound than charcoal tubes when taken on identical hot stamping machines (1.72 mg/M^3 compared to 0.18 mg/M^3). Therefore, future sampling on these machines for cresol and butyl carbitol should be done with silica gel tubes.

Ventilation measurements were taken in the cementing rooms. There were three local exhaust hoods installed in 1976. Hood #1 pulls 1050 cubic feet per minute (cfm), hood #2 pulls 1500 cfm, and hood #3 pulls 2700 cfm. Capture velocities at the basketball carcass cleaning and cementing room (hood #1) were 100 to 110 feet per minute (fpm) and 90 to 105 fpm (hood #2). Slot exhaust velocities for the basketball panel cementing operations at one workbench (Room 1) ranged from 400 to 650 fpm. At another workbench (Room 2), slot velocities ranged from 800 to 1500 fpm. Slot velocities and designs were determined to be inadequate at this plant. Figure 1 is an example of an acceptable workbench for control of organic vapors during dip tank and solvent draining operations. Such a design with flanges on each side may increase collection efficiency of organic vapors during basketball washing and panel plying operations. It was noted that no ventilation was provided for one worker in the cement room who was mixing cement and solvents in a 5- gallon can.

B. Medical

Based on the result of questionnaires and physical examinations, a total of eight lacers were found to have had contact dermatitis at some time during the past 2 years involving the inner aspects of one or both forearms. This was variously described as a pruritic rash, red in color, maculopapular, "like hives," lasting between one day to several weeks, and recurring over a period of several years, especially during heat spells or periods of excessive sweating.

Onset varied between one month and one year after beginning lacing. It resolved spontaneously in most cases after a few days. It was exacerbated by heat, sweat, "fuzzy lace," and return to work after a weekend or layoff. No history of atrophy was given in any of the cases. No cases were found in non-lacers.

One lacer and one former lacer had more severe cases of contact dermatitis.

The first case was a 39-year old woman employed since 1976 as a lacer. She had a previous history of allergic contact dermatitis to tints, dyes and bleaches diagnosed while she was previously employed as a beautician. She developed a pruritic blister-like erythematous rash on her arms and face

within several weeks of beginning lacing at Wilson. After a brief layoff and subsequent transfer to basketball panel-ply, her symptoms improved. However, shortly after transfer to an area where she handled gloves again she developed an itching rash once again on her arms, face, and legs, leaving a hypo-pigmented ring when healed. She was treated with topical and systemic steroids and gradually improved after 13 weeks away from work. She continues to work as a lacer, but has continued symptoms of rash and itching. She declined to release the name of her physician or copies of her medical records including patch tests.

The second case is a 30-year old man who began work at Wilson in 1973. He had no prior history of allergies or skin problems. He worked for 2 years in the Helmet Department, then worked without reported skin problems in the Lacing Department from 1975 to 1978. He was subsequently transferred to the Glove Finishing Department and had onset of a pruritic rash on his arms, hands, legs and feet in the summer of 1979. This started as a red blister, peeled, then left a hypopigmented ring at the affected sites. This was treated by topical ointment. No patch tests were reported by the patient.

All lacers evidenced various degrees of discoloration of the palmar aspects of the hands and fingers, and most demonstrated mild to moderate cracking of the skin of the fingers, with dryness and peeling of the skin.

There was no significant difference in the prevalence of other symptoms between lacers and non-lacers. The most prevalent symptoms included fatigue in 65% of all respondents, and burning of the eyes in 42% of the workers, with no significant difference between lacers and non-lacers.

Urine samples collected early and late in the shift from lacers, and once during the shift from other workers, were analyzed for total aromatic amines by the TNBS colorimetric method with a detection limit of 1 ppb (Table 3). Thin layer chromatography (TLC) was performed on samples with greater than 3 ppb aromatic amines (Table 4). A total of 22 of 28 workers with urine samples had detectable aromatic amines in their urine. Ranges were between 1.0 - 19.6 ppb. The mean of morning samples was 2.03 $\pm$ 1.33 ppb, the mean of afternoon samples was 2.86 $\pm$ 3.95 ppb. One sample resembled benzidine on TLC.

For comparison, NIOSH,[12] in a study of dye workers and controls with no known exposure to dyes in various industries, found that of 23 controls, 8 had detectable aromatic amines in their urine with a mean of 1.6 $\pm$ 0.7 ppb, with none resembling benzidine on TLV. In a dye manufacturing plant, of 17 sampled, 16 had detectable aromatic amines in their urine, with a mean of 5.2 $\pm$ 3.3 ppb. Two of these resembled benzidine on TLV.

Thus, in our sample, mean values were greater than previous NIOSH controls, but less than workers in dye manufacturing.

The highest urinary aromatic amine level was 19.6 ppb in a sewing machine operation.

Several drugs, such as antihistamines, contain free aromatic amines and may react to give false positives[12]. However, on TLC these substances do not correlate with the Retention factor (Rf) of benzidine.

The lacers were thought initially to have the highest risk for absorption due to their continuous direct skin contact with dyed leather and high frequency of irritant dermatitis of the hands. However, the mean urinary aromatic amines of lacers (2.0 ppb) was not significantly different from non-lacers (3.1 ppb). When mean morning samples of lacers (2.0 ppb) were compared with the mean afternoon samples (2.8 ppb), there was no significant overall increase and mean urine aromatic amine levels of cases of irritant dermatitis (2.9 ppb) were not significantly different from controls (2.8 ppb).

C. Epidemiologic Review of Insurance Records

Review of the three available death certificates revealed no cases of bladder or other cancers. Deaths were due in one case to arteriosclerotic heart disease in an 80-year old white male, in one case to cerebrovascular accident secondary to generalized arteriosclerosis in a 67-year old white female, and in one case to coronary occlusion in a 51-year old white female.

The causes of permanent total disability are listed in Table 5. Machine operators tended to have an increased prevalence of permanent total disability from arthritis, but this was not statistically significant. Arthritis was the most frequent cause of disability (11/24), followed by heart disease (6/24), hypertension (2/24), and lung disease--unspecified type (2/24). No cases of cancer were reported.

The random sample of insurance claims filed over the previous 2 years revealed no cases of bladder cancer or grossly excessive reports of other types of morbidity. (See Table 6).

The determination of carcinogenic risk in this population is difficult due to the relatively small numbers of exposed workers. The available death certificate records are inadequate in number to perform an epidemiologic investigation, and morbidity records (disability and third party insurance records) are biased toward acute or disabling diseases and are less likely to reveal cases of cancer. Thus, workers at the Wilson Ironton facility may be at increased risk of cancer due to exposure to benzidine or aniline-based dyes, but the present study was unable to detect this.

VII. RECOMMENDATIONS

A. Prevention of Dermatitis

In order to decrease the dermatitis problem in the baseball glove lacing area, the company should:

1. Provide adequate hand protection to prevent abrasion and discoloration during the lacing operation. This might be achieved by the provision of open-backed, form-fitting gloves with open mesh or air holes covering the palms, similar to lightweight driving or bicycling gloves.

2. Replace washroom Borax and other abrasive soaps with a liquid, non-abrasive soap.

3. Make hand cream and disposable towels available at a central work station. (Hand cream may be applied as often as necessary to prevent cracking and staining of hands.)

4. Housekeeping should be improved in the Lacing area and leather dust levels kept to a minimum.

5. Encourage good personal hygiene by the frequent washing of hands, especially before eating and before going home.

6. Educate the employees about the nature, cause, and prevention of skin problems.

7. Institute surveillance of dermatitis problems by providing prompt consultation with a dermatologist to workers complaining of skin problems.

B. Ventilation

1. Local exhaust ventilation should be installed at all hot stamping machines to exhaust the large amount of smoke and potentially harmful contaminants resulting from this process.

2. A make-up air system should be installed to replace exhausted air in the cement rooms. In the winter the make-up air should be heated.

3. Cement preparation (by the addition of solvents) should be conducted in a ventilated area where solvent vapors and other organic substances are drawn away from workers' breathing-zones. The present system of stooping over cement cans while adding solvent and mixing is not recommended.

4. The exhaust ventilation needs improvement where the edges of the rubber basketball carcasses are sanded. Figure 2 is an example of an acceptable grinder wheel hood for control of dusts. Such a design with side flanges may increase capture efficiency of rubber dust during basketball carcass sanding operations.

5. Improved housekeeping is needed in the lacing area. Hands and forearms should be protected from exposure to leather dyes and dust by gloves and/or long-sleeved smocks. Vacuuming is the recommended procedure for removal of leather dusts.

6. Broken windows should be replaced in the back of the panel-ply tray booth in the cement room so that effective local exhaust ventilation can be maintained.

7. NIOSH-approved eye protection should be made available to workers washing basketball carcasses with solvents.

8. Eye-wash facilities should be installed near cement rooms in case of solvent inadvertently splashing in eyes.

9. Eating at work stations should be discouraged to avoid contamination of food by leather dust.

C. Surveillance of Carcinogenic Risk

1. Death certificates collected as part of death benefits should be filed, monitored, and maintained for 30 years. Copies should be made available to union representatives. If an unusual pattern of mortality is suspected on the basis of this monitoring, further evaluation may be needed.

VIII. REFERENCES

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IX. AUTHORSHIP AND ACKNOWLEDGEMENTS

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X. DISTRIBUTION AND AVAILABILITY

Copies of this report are currently available, upon request, from NIOSH, Division of Technical Services, Information Resources and Dissemination Section, 4676 Columbia Parkway, Cincinnati, Ohio 45226. After 90 days the report will be available through the National Technical Information Service (NTIS), Springfield, Virginia. 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. Plant-Manager, Wilson Sporting Goods Co., Ironton, Ohio
2. Local President, International Chemical Workers Union
3. Industrial Hygienist, International Chemical Workers Union
4. U.S. Department of Labor - OSHA, Region V
5. NIOSH, Region V

For the purpose of informing the affected employees, the employer shall promptly "post" for a period of 30 calendar days, the Evaluation Report in a prominent place(s) near where the exposed employees work.

Table 1

Personal Breathing-Zone Results of
Contaminants Found in Basketball Carcass
and Cementing Room

Wilson Sporting Goods Company
Ironton, Ohio
HE 80-215

August 26, 1980

Reported in milligrams per cubic meter (mg/M^3)

Job	Sampling Times	Hexane	Toluene	Petroleum Naphtha*
Solvent rinse basketball carcass cementing	8:13-14:28	77	184	624
Solvent rinse basketball carcass cementing	8:10-14:28	109	105	589
Cementing basketball panels	8:20-14:29	105	68	318
Environmental Criteria:				
OSHA (8-hour TWA[1])		1800	753	2950*
NIOSH (10-hour TWA)		352	376	350

1. TWA = Time-Weighted Average.

*Stoddard solvent used as reference for quantitation of petroleum naphtha compounds with C_9-C_{12} range.

Table 2

Contaminants found in air
while hot stamping Wilson "Logo" into leather basketballs and gloves

Wilson Sporting Goods Company
Ironton, Ohio
HE 80-215

August 26, 1980

Contaminants Reported in milligrams per cubic meter (mg/M^3)

Sample Type	Job/Location	Sampling Times	Hexane	Heptane	Petroleum Naphtha	Toluene	O-Cresol Isomer	Butyl Carbitol
Personal	Leather stamping machine, baseball gloves (basement)	7:20-14:35	1.12	0.04	2.47	ND*	---	---
Personal	Leather stamping machine, baseball gloves (basement)	7:20-14:35	---	---	---	---	ND	ND
Personal	Leather stamping machine, basketball panels (3rd floor)	7:37-14:20	1.76	17.59	62.43	14.49	---	---
Personal	Leather stamping machine, basketball panels (3rd floor)	7:37-14:20	---	---	---	---	ND	ND
Process	Leather stamping machine, basketball panels (3rd floor)	7:50-14:25	1.51	6.54	22.38	12.80	0.18	0.66
Process	Leather stamping machine, basketball panels (3rd floor)	7:50-14:25	---	---	---	---	ND	ND
Process	Leather stamping machine, basketball panels (3rd floor)	8:35-14:20	---	---	---	---	1.72	3.91
Process	Leather stamping machine, basketball panels (3rd floor)	8:35-14:20	---	---	---	---	ND	ND
Environmental Criteria (Time-Weighted Average 8-hour exposure):								
	OSHA:		1800	2000	2000	2000	753	22.0
	NIOSH:		352	348	350	350	375	---

*N.D. = Nondetectable concentration

Table 3

Aromatic Amines in Urine

Wilson Sporting Goods Company
Ironton, Ohio
HE 80-215

Sample No.	Job Classification	AM Samples Urine Aromatic Amine (ppb)	PM Samples Urine Aromatic Amine (ppb)	Case of Contact Dermatitis
424-7	Lacer	1.9	3.3**	+
425-3	Lacer	1	1	+
426-0	Lacer	2.4	1.9	-
427-6	Lacer	1.5	2.1	+
428-2	Machine Operator	2.8**	-	-
429-9	"	1	-	-
430-6	"	-	2.1	-
431-2	"	-	19.6**	-
432-9	Sorter	-	1.0	-
433-5	Lacer	-	1	-
434-1	Stamper	-	1.3	-
435-8	Cementer	-	1	-
436-4	Lacer	-	1.1	-
438-7	"	2.9	2.1	+
439-3	"	2.1	3.6	+
441-7	Packing	1.2	2.1	-
442-3	Lacer	4.4	2.3	+
443-0	"	1.0	1	+
444-6	"	1	*	+
445-2	"	1.3	1.3	-
446-9	Inspector	1.0	1.5	-
447-5	Lacer	5.8**	3.9**	+
448-1	Machine Operator	1.2	*	-
450-5	"	1.7	-	-
451-1	"	2.8	-	-
453-4	Welder	-	6.3**	-
456-3	Welder	-	1.7	-
459-2	Cementer	-	2.1	-

* - Sample lost
** - TLC run

Analyst: C.H. Johnson and F.N. Hamilton
Date: October 1, 1980

Table 4

Thin Layer Chromatography on Samples >3 ppb Aromatic Amines

Wilson Sporting Goods Company
Ironton, Ohio
HE 80-215

Sample No.	Time	Retention Factors (Run No. 1)	(Run No. 2)
424	7 P.M.	0.47	0.47
428	2 A.M.	0.59	0.54
431	2 P.M.	0.59	
447	5 A.M.	0.54	0.56
447	5 P.M.	0.66	
453	4 P.M.	0.60	
800 ng/ml Standard		0.46	(Range 0.40-0.50) n=6

Analyst: C.H. Johnson
Date: October 1, 1980

Table 4a

Mean Urinary Aromatic Amines:
Morning vs. Afternoon Samples

Wilson Sporting Goods Company
Ironton, Ohio
HE 80-215

	AM	PM
Number:	18	22
Mean (ppb):	2.0	2.8
Standard Deviation:	1.3	3.9
Test of Significance:	0.84	
Degrees of Freedom:	38	
p value:	.10	

Table 4b

Mean Urinary Aromatic Amines:
Lacers vs. Non-Lacers

Wilson Sporting Goods Company
Ironton, Ohio
HE 80-215

	Lacers	Non-Lacers
Number:	13	15
Mean (ppb):	2.0	3.1
Standard Deviation:	1.2	4.7
Test of Significance:	0.85	
Degrees of Freedom:	26	
p value:	.10	

Table 5

Ironton Hourly Employees on Permanent Total Disability (P.T.D.)

Wilson Sporting Goods Company
Ironton, Ohio
HE 80-215

Date Hired	Date Last Worked	Occupation	Cause of P.T.D.
12/14/54	3/24/71	Lacer	Rheum. Arthritis
10/04/59	4/04/75	Mach. Oper.	Arthritis
5/13/52	4/28/77	Cutter	Deg. Arthritis
8/11/52	7/24/73	Inspector	Hypertension
9/10/52	6/04/76	Mach. Oper.	Arthritis
4/28/53	12/03/75	Inspector	Diabetes
1/06/54	10/08/76	Mach. Oper.	Osteo. Arthritis
2/22/52	10/15/75	Bench Worker	Myocard. Infarct. Mastectomy
12/04/50	11/07/74	Glove Dept.	Car Accident
2/17/57	11/18/76	Lacer	Arthritis Mig. Headaches
11/11/46	2/21/72		Deg. Arthritis
3/18/55	2/24/74	Cementer	Arthritis
3/12/56	10/09/79	Inspector	Arthritis
10/07/52	4/23/76	Cementer	Lung Disease
4/24/44	10/21/76	Mach. Oper.	Heart Disease
1/07/49	9/24/71	Sew. Mach. Oper.	Hypertension
12/31/53	1/21/76	Mach. Oper.	Arthritis
2/09/66	10/17/77	Cementer	Diverticulitis Ulcer
2/25/57	6/21/78	Bench Worker	Arthritis
1/07/53	12/24/77	Lace Inspector	Aneurysm
1/18/50	10/28/74	Cutter	Heart
9/11/52	11/30/71	Bench	Heart
4/20/53	6/11/76	Inspector	Pul. Disease
1/14/54	4/09/74	Glove Lacer	Coronary

Table 6

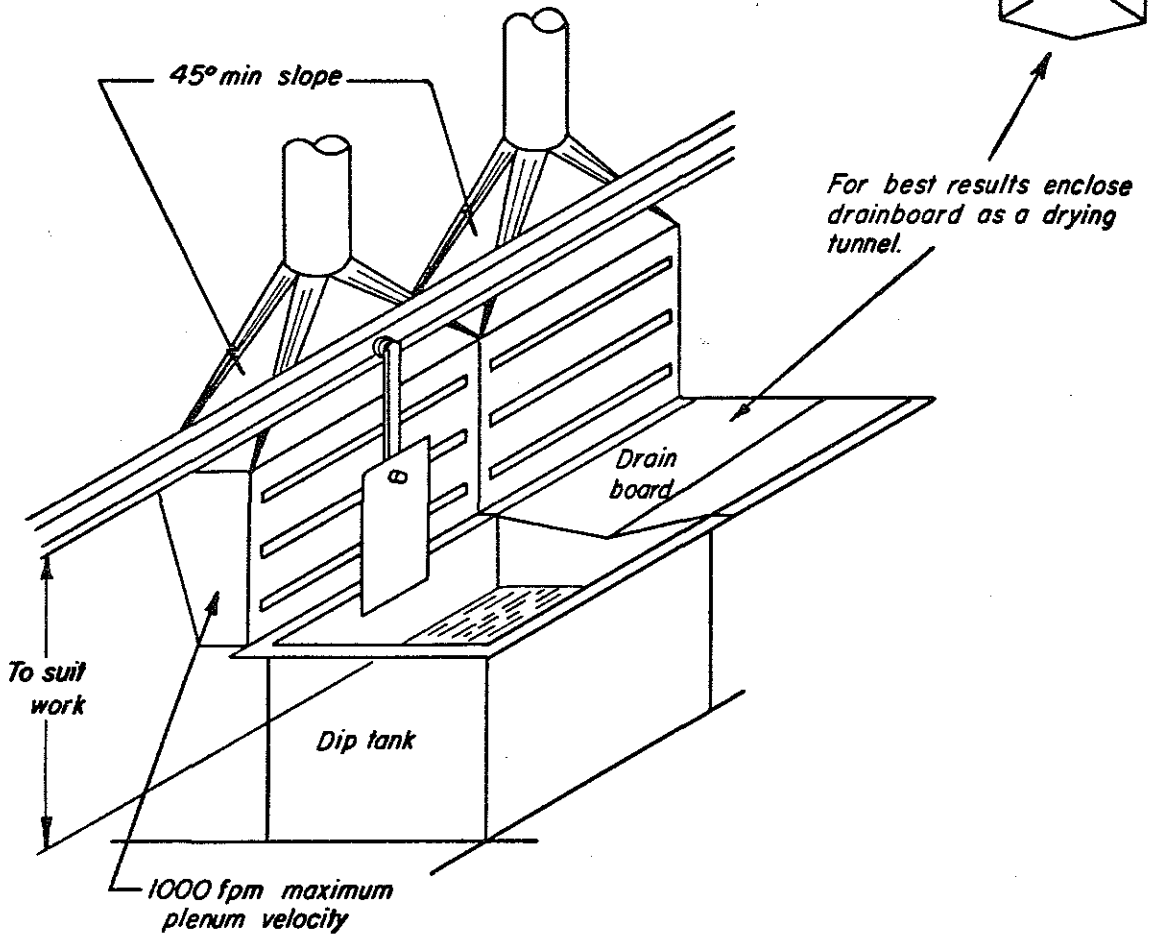
Diagnoses Listed on Third Party Medical Insurance Claims
Ironton facility

Wilson Sporting Goods Company
Ironton, Ohio
HE 80-215

Diagnosis	# Reporting
Pain, various sites	6
Skin cancer (basal cell)	1
Benign skin lesions	3
Diabetes mellitus	3
Musculoskeletal injury	3
Eye injury	3
Chest illness	2
Infection various sites	2
Gastritis	1
Skin rashes	1
Thrombophlebitis	1
Inner ear problem	1
Thyroid problems	3
Chest pain	7
Kidney disease	2
Breast cancer	1
Hypertension	1
ASVD	1
Drug overdose	1
Diverticulitis	1
Fibroid tumor	1
Pregnancy	1
Gall bladder disease	1
Rectal/vaginal bleeding	2
Anal fistula	1
Ulcer	1
Depression	1
Arrythmia	1
Laceration	1
Headache	1
Bowel adhesion	1

FIGURE 1

Wilson Sporting Goods Company
Ironton, Ohio HE 80-215
INDUSTRIAL VENTILATION



Q = 125 cfm/sq ft of tank and drainboard area
Slot velocity = 2000 fpm
Entry loss = 1.78 slot VP + 0.25 duct VP
Duct velocity = 1 000 - 3000 fpm

NOTE: For details on drying oven, See VS-602

For air drying in a room or enclosure, see Section 2 for dilution ventilation required.

For construction and safety, consult NFPA.(113)

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DIP TANK

DATE 1-78 | VS-502

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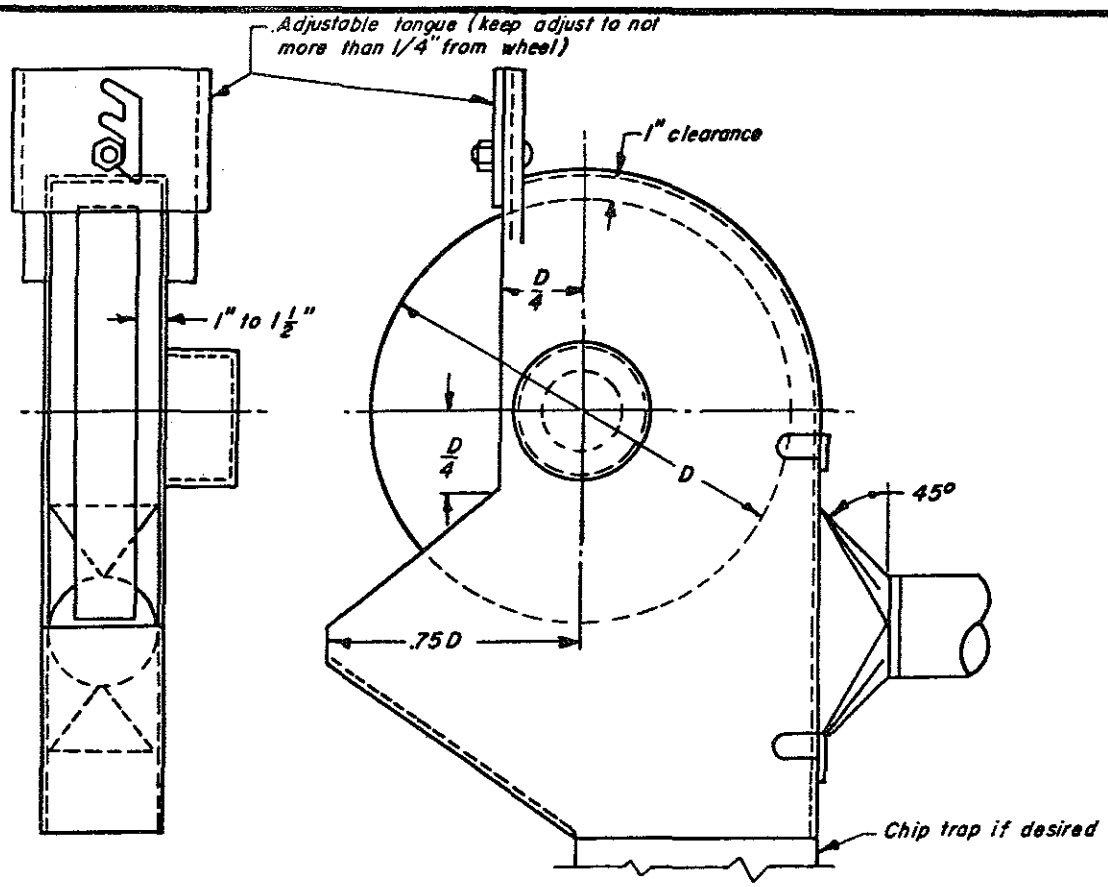
FIGURE 2

Wilson Sporting Goods Company
Ironton, Ohio HE 80-215
INDUSTRIAL VENTILATION



EXHAUST VOLUME, CFM

Wheel diam inches	Wheel width inches	Good enclosure*	Poor enclosure
to 5	1	220	220
over 5 to 10	1 1/2	220	300
over 10 to 14	2	300	500
over 14 to 16	2	390	610
over 16 to 20	3	500	740
over 20 to 24	4	610	880
over 24 to 30	5	880	1200
over 30 to 36	6	1200	1570

* No more than 25% of wheel exposed.

Minimum duct velocity = 4500 fpm in branch
3500 fpm in main

Entry loss = 0.65 VP for straight takeoff
0.40 VP for tapered takeoff

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GRINDER WHEEL HOOD
SPEEDS BELOW 6500 sfm

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