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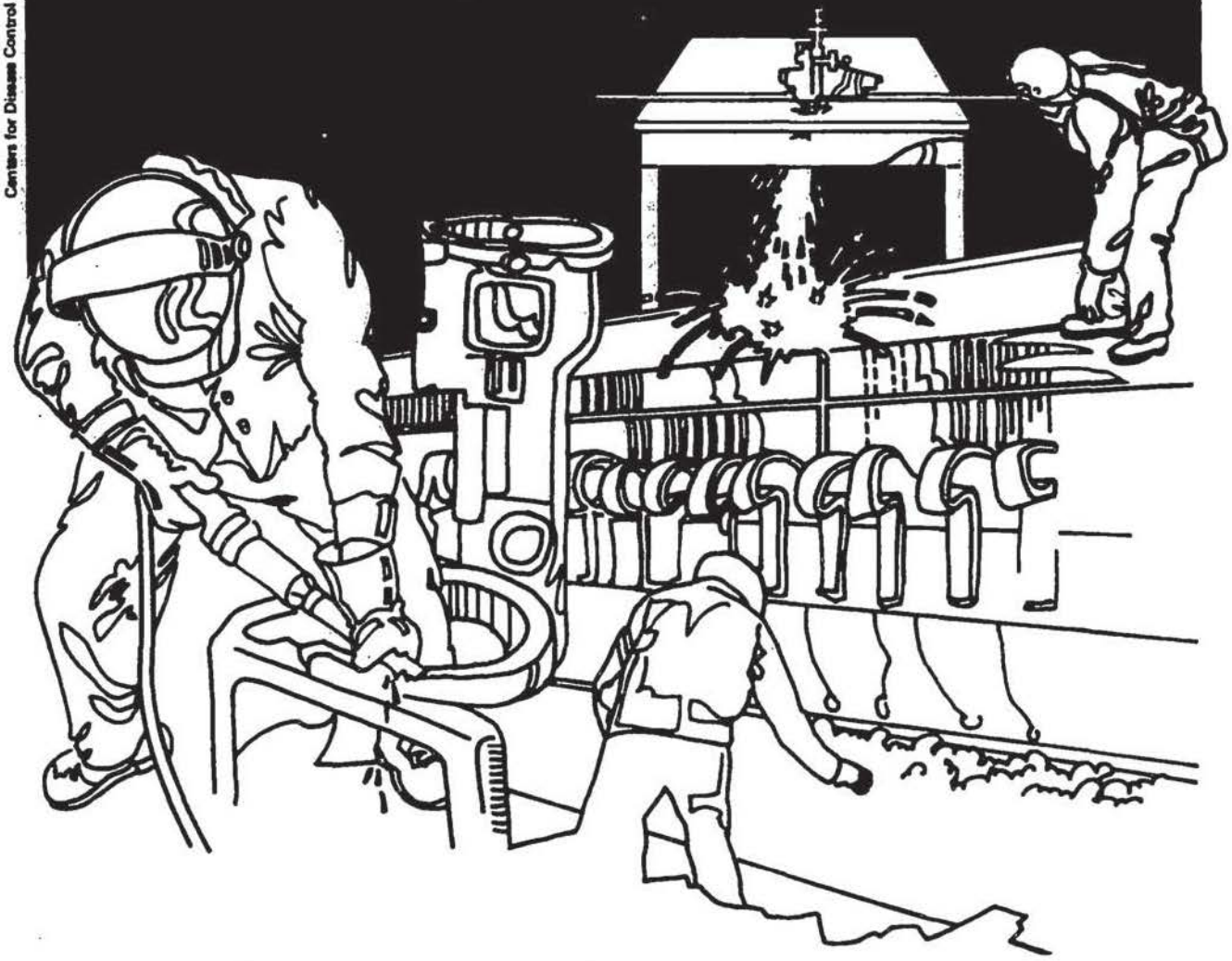

Health Hazard Evaluation Report

HETA 82-243-1235
ROTEPOHL JEWELER INC.
CINCINNATI, 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.

Mention of company names or products does not constitute endorsement by the National Institute for Occupational Safety and Health.

HETA 82-243-1235
DECEMBER 1982
ROTEPOHL JEWELER INC.
CINCINNATI, OHIO

NIOSH INVESTIGATORS:
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I. SUMMARY

In June, 1982, the National Institute for Occupational Safety and Health (NIOSH) was asked by Rotepohl Jeweler Inc., Cincinnati, Ohio to evaluate the etiology of nasal congestion, sneezing, eye irritation, headaches, and burning of the face in two individuals who usually operate the retail jewelry store. It was suspected that the worker's symptoms were caused by airborne contaminants generated in an adjoining beauty salon and spread through a common ventilation system.

On June 23, 1982, NIOSH conducted an environmental and medical evaluation. The evaluation included air sampling and evaluation of the air handling system, review of two medical records, and interviews with seven workers.

The products in principal use in the beauty salon were LaMaur hair sprays and Revlon-Realistic permanent solutions. Air sampling was conducted in the beauty salon and jewelry store to measure airborne concentrations of diethyl phthalate, polyvinyl pyrrolidine, vinyl acetate, ethanol, methylene chloride, isopropyl alcohol and ammonia all of which are known constituents of either the hair sprays or permanent solutions. Although similar odors were noted in the beauty salon and jewelry store, no detectable airborne concentrations of any of the above substances could be found in the jewelry store. Of those substances detected in the beauty salon the two results for each were: ethanol - 13 and 23 mg/m^3; methylene chloride - non-detectable and 5 mg/m^3; isopropyl alcohol - 1.7 mg/m^3 each; and ammonia - 0.2 and 0.5 mg/m^3. All were 2% or less of the applicable exposure criteria. There was no evidence of airborne polyvinyl pyrollidine, diethyl phthalate, or vinyl acetate. The air handling system was found to re-circulate air among each of five different stores and was therefore capable of transferring contaminants from the beauty salon to the jewelry store..

None of the workers in the beauty salon, where air concentrations of contaminants were highest, reported any allergies or mucous membrane irritation. One jewelry store employee complained of nasal congestion and eye irritation. The other has noted nasal congestion, sneezing, eye irritation, headaches, and burning of the face. Workers in adjacent shops reported occasional offensive odors, especially upon first entering their stores.

While it is not possible from the results of this survey to specifically link the allergic symptoms of the jewelry store employees to any specific chemical exposure, it is conceivable that these two individuals are unusually sensitive to one or more of the chemicals found in hair sprays and/or permanent solutions and that exposure to even very low levels of these materials may exacerbate their allergic symptoms. For the benefit of the workers and patrons of the four stores sharing the ventilation system with the beauty salon, it is recommended that air from the beauty salon be exhausted directly to the outside and not re-circulated to adjacent shops.

KEYWORDS: SIC 7231 (Beauty Salon) hair sprays, permanent solutions, polyvinyl pyrrolidine, diethyl phthalate, vinyl acetate, ethanol, methylene chloride, isopropyl alcohol, ammonia.

II. INTRODUCTION

In June 1982, NIOSH was requested to evaluate the environment at Rotepohl Jewelry Store, Cincinnati, Ohio. One employee, who is normally one of the two or three people operating the store, was concerned that air contaminants generated in a neighboring beauty salon and infiltrating the jewelry store via a common ventilation system, may be responsible for the etiology of systems such as nasal congestion, sneezing, eye irritation, headaches, and burning of the face, which this employee and another frequently experience while at work.

III. BACKGROUND

Rotepohl Jeweler, Inc. is a family owned and operated business involved primarily with the sale of jewelry. Some repair work is also done. For the last 11 years, the business has been located in a 30-year-old shopping center. No jewelry is manufactured in the shop, and no solvents have been used to clean watches since July 1981. The only chemical used in the shop is a solution for cleaning silver which contains thiourea and sulfuric acid. This chemical is used twice a week for only 2 - 3 minutes.

A significant feature of this facility is that it is one of five businesses that are serviced by the same forced-air heating/cooling system. Therefore, contaminants generated in any of the five stores will be circulated among the others. Except for the restrooms, none of the stores have exhaust systems. The other stores include a beauty salon, liquor store, bookstore, and barber shop.

The facility on the west side and adjacent to the jewelry store is the beauty salon. One worker in the jewelry store began noticing problems when starting to work there full time about a year ago.

IV. METHODS

A. Environmental

Through the cooperation of the owner, the products used during normal operation of the beauty salon were reviewed to determine which air contaminants could possibly be generated and re-circulated to the jewelry store. The two primary products used are hair-sprays and permanent wave solutions. The hair sprays used were LaMaur Inc. products. The following ingredients were listed on the aerosol cans; S D alcohol 40, isobutane, polyvinyl pyrroldine/vinyl acetate copolymer, diethyl phthalate, isopropyl alcohol, methylene chloride, ammonium flouro-octyl phosphate, vinyl acetate/crotonic copolymer, dimethicone, and amino methyl propanol. The primary permanent wave solutions were made by Revlon-Realistic. There were no ingredients listed, but communication with the manufacturer indicated that the products of interest were glycolic acid solutions containing ammonium thioglycolate and a small amount of sodium hydroxide.

Based on this information, air samples for the following substances were collected in both the beauty salon and the jewelry store: diethyl phthalate, polyvinyl pyrrolidine, vinyl acetate, ethanol, methylene chloride, isopropyl alcohol, and ammonia. These air samples were collected at two sampling locations in the beauty salon and jewelry store. The sampling and analytical methods used are described in Table I.

B. Medical

The two individuals who work in the jewelry store were interviewed about their work activities, medical and occupational history, and current allergic symptoms. In addition, their medical records covering the past two years were obtained from their private physicians and reviewed. A number of employees of the other stores on the same ventilation system were questioned about allergies or symptoms of mucous membrane irritation.

V. EVALUATION CRITERIA

The most frequent allergy among workers in beauty salons is to p-phenylenediamine (1), found in some "permanent" organic dyes, but this material is not used at the beauty salon. None of the chemicals found in the various hair sprays and permanent solutions used in the beauty salon has been reported to cause allergies.

A number of the chemicals in hair sprays, including diethyl phthalate, isopropyl alcohol, methylene chloride, and vinyl acetate can cause mucous membrane irritation at sufficiently high concentrations.

The most common ingredient in permanent wave solutions is ammonium thioglycolate, which emits a noxious odor. A small amount of ammonium hydroxide, which can emit ammonia, a primary irritant, is also present.

Table I lists exposure criteria for those substances evaluated and also the primary health effects which may result from over-exposure.

It is well recognized that because of a wide variation in individual susceptibility, a small percentage of workers may experience discomfort at concentrations below accepted exposure criteria. A smaller percentage of people may be affected more seriously by aggravation of a pre-existing condition.

VI. RESULTS

A. Environmental

Only two beauticians were working on the day of the survey. On a busy day, five or six would be busy during certain times of the day.

None of the contaminants evaluated in the beauty salon were detected in the jewelry store on the day of the survey (Table II). There was no evidence of diethyl phthalate, polyvinyl pyrrolidine, or vinyl acetate in either location. Of those substances detected in the beauty salon the two samples for ethanol were 13 and 23 mg/m^3; for methylene chloride were non-detectable and 5 mg/m^3; for isopropyl alcohol were each 1.7 mg/m^3; and for ammonia were 0.2 and 0.5 mg/m^3. All were well below the applicable exposure criteria (see Table II).

B. Medical

Both individuals at the jewelry store are involved almost exclusively in retail sales. Neither had worked at previous jobs which could likely have involved exposure to sensitizers. One employee at the jewelry store who complained of nasal congestion and eye irritation for the past few years has a four year history of allergies to dust, mold, and feathers, receives biweekly allergy shots, and has been on a variety of antihistamine medications. Medical records indicate that during the past two years this employee has seen a physician multiple times for allergies, rhinitis, chronic sinusitis, headaches, and upper respiratory infections. The employee reported smelling an ammonia-like odor when he first entering the jewelry store from outside.

The second employee has worked regularly at the jewelry store since August 1981, and has noted the following symptoms since that time: nasal congestion, sneezing, eye irritation, headaches, and burning of the face. The symptoms last for about four hours after the employee leaves the store, and are worst in the spring and fall. The employee has a four year history of sinusitis, and has been on a variety of decongestants. Medical records indicate that the employee has seen a physician frequently over the past two years for sinusitis and upper respiratory infections. The employee reported a perfume-like smell in the store, unlike that of a "permanent" solution.

One employee of the liquor store stated that an ill-defined odor was detectable about once a week in the store, and that customers had occasionally complained about it. The other employee had worked at the liquor store for less than two months, and noted no odors. Neither employee had any allergic symptoms.

At the bookstore, one employee noted a "permanent" smell about once a week, most readily detectable immediately after she entered the store from outside. A second employee noted no odors, and a third complained of sneezing spells when she would enter the jewelry store.

Two to five individuals work at the beauty shop, depending on the day of the week. None of the employees reported any allergic symptoms, although several workers stated that the smells from the "permanent" solutions became quite objectionable on busy days and felt that the ventilation could be improved.

VII. DISCUSSION

Even though the day that the environmental sampling was conducted was considered a "light" day as far as the beauty salon operation is concerned, the results do serve to characterize potential air contaminants. Beauty salon odors were detectable in the jewelry store on the day of the survey.

The re-circulation of air from the beauty salon into spaces of dissimilar use is not a good practice. In fact, the current Ohio Basic Building Code (Section 10, Article 10) would not permit this. Although the level of re-circulated air contaminants may not constitute a health hazard, they can cause discomfort to the operators and patrons of the other stores.

None of the workers in the beauty shop, where concentrations of chemicals from hair sprays and permanent wave solutions would be highest, reported any allergies or symptoms of mucous membrane irritation. Transient odors were reported by employees of the liquor, jewelry and book stores. Since five stores are on the same ventilation system, it is likely that the various sprays and solutions used in the beauty salon are the source of these odors. Since none of the materials used in the beauty salon contain chemicals known to cause allergies, since only the workers in the jewelry store reported allergic symptoms, and since one employee of the jewelry store has a history of non-occupational allergies and the other a history of chronic sinusitis prior to working regularly in the jewelry store, it is not possible to link the allergic symptoms of the jewelry store employees with any exposure to chemicals coming through the ventilation system. It is conceivable that the individuals working in the jewelry store are unusually sensitive to certain chemicals found in various hair preparations and/or that exposure to low levels of irritants, such as ammonia in permanent wave solutions or chemicals in hair sprays, may exacerbate their allergic symptoms.

VIII. RECOMMENDATIONS

The beauty salon air should be exhausted directly to the outside and not re-circulated to areas of dissimilar use.

IX. REFERENCES

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3. International Labour Office. Encyclopedia of occupational health and safety. Vol I/a-k. Geneva: International Labour Office, 1971.

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XI. DISTRIBUTION AND AVAILABILITY OF REPORT

Copies of this report are currently available upon request from NIOSH, Division of Standards Development and Technology Transfer, 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. Rotepohl Jeweler's Inc.
2. Shirl-Kay Beauty Salon
3. NIOSH, Region V
4. 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

Sampling/Analytical Methods
Exposure Criteria, Health Effects

Rotepohl Jeweler, Inc.
Cincinnati, Ohio
HETA 82-243

June 23, 1982

Substance	Sampling Method	Analytical Method	Exposure Criteria (mg/m^3)	Primary Health Effects
Diethyl Phthalate	P&CAM#533, Fluorsil tube in line with celulose membrane filter	CS_2 Desorption GC/FID analysis	5	Upper respiratory system irritant, central nervous system depressant at high concentrations
Polyvinyl Pyrrolidone (PVP)	Impinger Solution(1)	Spectrometry(1)	None	None Reported
Vinyl Acetate	Charcoal Tube(2)	2% Acetone in CS_2 Desorption GC/FID analysis(2)	30	Irritant to throat and upper respiratory system in high concentrations
Ethanol	Charcoal Tube	CS_2 Desorption GC/FID analysis	1900	Eye and upper respiratory tract irritant
Methylene Chloride	P&CAM S-329, charcoal tube	CS_2 Desorption GC/FID Analysis	360	Fatigue, light headedness, nausea, eye and skin irritant
Isopropyl Alcohol	P&CAM S-65, charcoal tube	CS_2 Desorption GC/FID Analysis	980	Mild eye, nose and throat irritant, drowsiness, skin irritant, nausea, cramps
Ammonia	P&CAM S-347 Silica Gel Tube	ion chromatograph	35	Eye, nose, throat irritant, skin burns, pulmonary edema

TABLE II

Air Sampling Results

Rotepohl Jeweler, Inc.
Cincinnati, Ohio
HETA 82-243

June 23, 1982

Location	Sampling Time	Contaminant Concentration (mg/m^3)						
		Diethyl Phthalate	Polyvinyl Pyrrolidone	Vinyl Acetate	Ethanol	Methylene Chloride	Isopropyl Alcohol	Ammonia
Beauty Salon, near return air grill	1014-1515	N.D.*	N.D.	N.D.	23	5	1.7	0.5
Beauty Salon, Front, center aisle	1015-1415	N.D.	N.D.	N.D.	13	N.D.	1.7	0.2
Jewelry Store, near front door	1038-1537	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Jewelry Store, Repair area	1038-1546	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Lowest Detectable Limit (mg/sample)		0.01	0.02	0.04	0.01	0.01	0.01	0.004
Mean Sample Volume, liters 228		315	30	30	5	30	30	
Lowest Detectable Limit, Air adjusted (mg/m^3)		0.04	0.06	1.3	0.3	2.0	0.3	0.1
Survey Criteria (mg/m^3)		5	None	30	1900	360	930	35

* N.D. - Not Detectible