



INDUSTRIAL HYGIENE STUDY

of the

St. Bernard One Hour Martinizing

Survey Date
August 8, 1977

Survey Conducted By
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November 22, 1977

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National Institute for Occupational Safety and Health
Cincinnati, Ohio

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16. Abstract (Limit: 200 words) An industrial hygiene study was conducted at the St. Bernard One Hour Martinizing facility in Cincinnati, Ohio, on August 8, 1977, as part of an effort to characterize worker exposure to perchloroethylene in the dry cleaning industry. Four personal samples and eleven area samples were collected and analyzed for perchloroethylene. Employees' average and peak exposures were within OSHA standards as well as the NIOSH recommended standard for perchloroethylene. Recommendations to further reduce exposure are made. ← <i>NIOSH, U.S. Department of Health and Human Services</i>					
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PLACE VISITED:

St. Bernard One Hour Martinizing
4429 Vine Street
Cincinnati, Ohio 45217
(513) 242-9724

DATE OF VISIT:

August 8, 1977

PERSON CONTACTED:

Paul Hau, Owner

NIOSH PERSONNEL PRESENT:

Mary Dinkel
Biological Science Technician

PURPOSE OF VISIT:

Industrial hygiene survey was conducted
as part of an effort to characterize worker
exposure to perchloroethylene (PCE) in the
dry cleaning industry.

SUMMARY/ABSTRACT:

An industrial hygiene survey was conducted at a dry cleaning facility in Cincinnati, Ohio utilizing perchloroethylene (tetrachloroethylene) as a solvent. The employees' average and peak exposures were within OSHA standards as well as the NIOSH recommended standard for perchloroethylene.

INTRODUCTION

Perchloroethylene (PCE) is used extensively throughout the dry cleaning industry with about 52,000 workers potentially exposed to PCE. To date the effects on humans from long term low level exposure to PCE is unknown. Current health standards for perchloroethylene are concerned with effects on the central nervous system, eyes, skin, respiratory tract, and liver. Headaches, dizziness, eye and throat irritation, nausea, coughing, and shortness of breath are symptoms of overexposure to PCE. PCE has structural similarities to a known carcinogen, (vinyl chloride) and suspected carcinogens (vinylidene chloride and trichloroethylene). However, no information has been found to show carcinogenic activity as a result of occupational exposures to PCE.

As part of the National Institute for Occupational Safety and Health (NIOSH) Industrywide studies of dry cleaning workers exposed to PCE, an industrial hygiene survey was conducted at the St. Bernard One Hour Martinizing Facility in Cincinnati, Ohio on August 8, 1977.

DESCRIPTION OF PROCESS

The facility was a "typical" dry cleaning operation utilizing PCE, having two employees responsible for dry cleaning. The work cycle begins first by loading 20 to 25 pounds of clothing, curtains, etc., into a washer. The textiles are cleaned by agitation in a PCE bath and by rinsing with clean PCE. Excess solvent is thrown off by centrifugal action. After the washing step the textiles are manually transferred to a dryer where they are tumbled to a dry state in warm air. Both the washer and dryer are exhaust ventilated with the PCE being reclaimed by a sniffer filtration and distillation unit. The sniffer is cleaned by a backflush process taking 90 minutes about once a week.

The women who manually transfer the clothing in and out of the washer to the dryer estimate the washer and dryer operate 40 hours per week on the average.

The washer and dryer lint traps are cleaned once a day by manually shaking for a few seconds. While the washing-drying cycle (about 30 minutes) is going on, the employees are also responsible for removing spots and stains from garments. Steam irons and various spot and stain removers (blood protein, paint, oil, grease, coffee, beer, fruit juice, and dye removers) as well as water repellants are utilized. There are also 3 part-time employees involved with customer drop-off and pick-up.

DESCRIPTION OF SURVEY METHODS

Four personal samples and eleven area samples were collected and analyzed for PCE. Sampled air was pulled by a calibrated MDA Accuhaler Model 808 pump operating at 90 cubic centimeters per minute (cc/m), through charcoal tubes (SKC Corporation) attached to the dry cleaning washer-dryer operator's lapel. Four area samples were collected near the dryer using charcoal tubes and calibrated MDA Accuhaler 808 pumps operating at 80 cc/min. One area sample was collected in the vicinity of the front counter using a calibrated MDA Accuhaler 808 pump at 80 cc/min. Six short-term (peak) PCE samples (2 to 3 minutes) were collected as closely as possible to the employee while she was transferring material from the washer to the dryer. These charcoal

tube peak-exposure samples were collected using calibrated MSA Model G pumps operating at 1.0 liter per minute.

RESULTS

The results of the air sampling for perchloroethylene are shown in Table 1. The dry cleaner's time-weighted average (TWA) exposures to PCE was within current OSHA standards (See Table 2). The TWA exposure measured over a 4 hour period was 57.9 ppm PCE which is over the NIOSH recommended standard. However, since the day's dry cleaning was finished by 12:30 p.m., the workers TWA exposure to PCE over the 8 hour work shift, assuming zero exposure for the afternoon, is approximately 30 ppm which is also lower than the NIOSH recommended standard of exposure to PCE based on a 8-hour TWA. The short-term or peak samples collected also did not exceed existing OSHA standards, ranging from 21 ppm to 124 ppm, with only one sample exceeding the NIOSH 100 ppm ceiling recommended.

DISCUSSION AND RECOMMENDATIONS

Although the dry cleaners time-weighted average and peak exposure to perchloroethylene was well below the OSHA standards, the potential for intermittent peak exposures to higher concentrations exists during emergency spills, or maintenance and repair operations.

NIOSH's recommendations for a Perchloroethylene Standard are stated in reference 2 and also include:

1. Pre-placement physicals
2. Respiratory protection for nonroutine operations causing brief exposure at concentrations in excess of the environmental limit such as maintenance, repair, or emergencies (e.g. accidental spills).
3. Gloves should be worn during the unloading of the washer to prevent skin contact with PCE.
4. Inform all employees of the hazards, relevant symptoms, effects of overexposure to, and the precautions concerning safe use and handling of PCE.
5. Storage containers, piping and valves should be periodically checked for leakage.

Table 1

St. Bernard One Hour Martinizing
Results of Perchloroethylene Analysis

Sample	Sampling Time	Type, Description	Perchloroethylene Concentrations ppm
M-11	808-914a	Personal, Dry Cleaner	72.6
M-10	914-1015a	Personal, Dry Cleaner	36.5
M-13	1015-1114a	Personal, Dry Cleaner	57.9
M-4	1114-1200p	Personal, Dry Cleaner	65.7
Combined	808a-1200p	Personal, Dry Cleaner	59.7 (4 hr. TWA)
M-2	840-843a	Peak, transfer from dryer	20.6
M-3	846-849a	Peak, transfer from dryer	23.1
M-15	935-937a	Peak, transfer from dryer	81.1
M-8	1015-1018a	Peak, transfer from dryer	40.8
M-1	1056-1059a	Peak, transfer from dryer	71.3
M-16	1124-1126a	Peak, transfer from dryer	123.8
M-7	814-915a	Area, Near Washer	9.7
M-6	915-1006a	Area, Near Washer	9.8
M-9	1006-1116a	Area, Near Washer	14.4
M-5	1116-1200p	Area, Near Washer	16.5
Combined	814a-1200p	Area, Near Washer	12.5 (4 hr. TWA)
M-14	818-1148a	Area, Front of Store	2.8

Table 2
Perchloroethylene (Tetrachloroethylene) Health Standards

	ppm, Perchloroethylene	
	OSHA Standard (1)	NIOSH Recommended Standard (2)
8-Hour Time Weighted Average	100	50
Ceiling concentration	200	100*
Acceptable maximum peak above the ceiling concentration for an 8-hour shift	300**	

* as determined by 15 minute samples, twice daily

**5 minutes in any 3 hours

REFERENCES

1. Occupational Safety and Health Administration (OSHA) General Industry Standards, Part 1910, Title 29 of the Code of Federal Regulations dated July 1, 1975. 1910.1000(b) Table Z-2.
2. Criteria for a recommended standard....Occupational Exposure to Tetrachloroethylene (Perchloroethylene) July 1976, HEW Publication No. (NIOSH) 76-185.

