U. S. DEPARTMENT OF HEALTH, EDUCATION AND WELFARE
CENTER FOR DISEASE CONTROL
NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH
CINCINNATI, OHIO 45226

HEALTH HAZARD EVALUATION DETERMINATION
HHE 80-43-679

PROCRAFT
SPOKANE, WASHINGTON
APRIL 1980

I. SUMMARY

On December 4, 1979 the National Institute for Occupational Safety and Health (NIOSH) received a request from the owner of Procraft, Spokane, Washington, to determine if a potential health hazard exists during the installation of plastic laminates to kitchen and bathroom counter tops. Prior to his first contact with NIOSH on November 1-6, 1979, he stated he exhibited behaviorial change which included irritability, violence and suicidal behavior. He began wearing a respirator for use with organic vapors shortly after the NIOSH contact. Personal samples were collected on December 4 and 5 to determine his potential exposure to solvents vapors which are vaporized from the contact adhesive used.

Based on environmental findings of this investigation, NIOSH has determined that the worker's time weighted average potential exposure to a combination of acetone, methyl ethyl ketone, naphtha and toluene, which were 2.27 and 3.77 times the evaluation criteria on respective days, was toxic as used and found. During a 26 minute period the potential exposure was 11.4 times the TWA criteria. The worker did not have any symptoms of headache, dizziness, lightheadedness or irritation of the eyes, nose or throat which may have been due to the fact that he wore a respirator. It appears that his past exposure would have been similar to those measured; and, since he was not wearing a respirator until two weeks prior to this study, it is probable he could have symptoms from exposure to the solvents listed above.

Recommendations to reduce the exposure to the solvent vapors are incorporated in detail on page three.

II. INTRODUCTION

Under the Occupational Safety and Health Act of 1979*, (Section 20(a)(6) NIOSH investigates the toxic effects of substances found in the workplace. The owner of Procraft requested such an investigation from NIOSH to evaluate the health hazards presented by exposure to the solvents present in contact adhesive. He called NIOSH on November 16, 1979, and submitted a written request on December 4, 1979, at which time the environmental survey was conducted. Results of the environmental data were reported to Procraft on January 31, 1980.

*Section 20(a)(6) of the Occupational Safety and Health Act of 1970, 29 U.S.C. 699(a)(6), authorizes the Secretary of Health, Education, and Welfare, following receipt of a written request from any employer or authorized representative of the employees, to determine whether any substance normally found in the place of employment has potentially toxic effects in such concentrations as ued or found.

III. BACKGROUND

Procraft is operated by a self-employed contractor. He installs kitchen and bathroom cabinets. Some come with preformed countertops with the plastic laminates already installed. On others he installs the plastic laminate on the job site. During this evaluation he was installing the plastic laminates on the job site.

The work consists of spreading the contact adhesive on the underside of the plastic laminate and on the surface to which it is to be applied. adhesive is brushed on the small narrow (counter edges) pieces and is rolled on the larger pieces. When rolling the adhesive, his breathing zone is 18 to 24 inches from the surface. Each house in the group he was doing had about 50 square feet of plastic laminate. The bathrooms were very small, with no ventilation or windows. The kitchens were also small; some had a window, others did not. Depending on the length of his work day, he would complete one to three houses.

He started this project in mid-July and in mid-August began having problems. He stated that he became irritated, violent and destructive and was suicidal. He also experienced some headaches and light headedness. During this time his work day was frequently 12 to 16 hours. He usually did not eat lunch; if he did he ate a small amount of snack foods. He did not wear a respirator.

He visited a physician to find the cause of this behaviorial change. The physician suggested his problems could be related to his solvent exposure. At this time he contacted NIOSH. The NIOSH hygienist agreed that his problem could be related to his work and strongly recommended that he immediately begin to wear a NIOSH approved organic vapor cartridge respirator, which he did.

IV. EVALUATION - DESIGN METHODS AND CRITERIA

The collecting medium, analytical methods, evaluation criteria and primary health effects are shown in Table 1.

V. RESULTS

Personal breathing zone samples were collected for solvent vapors during the installation of plastic laminates using contact adhesive. Seven samples were collected over two days which resulted in two time weighted average concentrations. There were four different vapors present (acetone, methyl ethyl ketone, naphtha and toluene). Since all four produce similar health effects, the exposures are considered additive. Based on this time weighted average the solvent concentrations on the two days were 2.27 and 3.77 times the evaluation criterion. One individual sample collected over a 26 minute period, when he was rolling the adhesive on the large flat surfaces, was 11.39 times the time weighted average criteria. The individual sample results are shown in Table 2. The worker wore a cartridge -type respirator approved for use with organic vapors the entire time he worked with the plastic laminates.

At the end of each day the worker stated he did not have a headache, feel dizzy or light headed and had no irritation of the eyes, nose or throat. This lack of symptoms may have been due to the fact that he wore a respirator.

Qualitative fit resting of his respirator using smoke tubes indicated that there was no leakage.

VI. SUMMARY AND CONCLUSION

The worker's exposure to acetone, methyl ethyl ketone, naptha and toluene exceeded the evaluation criteria by a factor of almost 4. The evaluation criteria is based on an 8-10 hour work day. Often during the time the worker was experiencing health effects he was working 14 to 16 hours a day and had poor eating habits. This combination of long work days and high concentrations of vapors could very probably produce irritation of the eyes nose and throat, narcosis, headaches, dizziness, lightheadedness, and possibly, in certain individuals, produce a behaviorial change.

VII. RECOMMENDATIONS

1. Continue to wear a NIOSH-approved cartridge-type respirator for use with organic vapors.

2. Provide fresh air through open windows and doors. In cold weather this may be more difficult since the drying time of the adhesive is affected by the temperature.

3. Continue to wear rubber gloves when brushing and rolling the contact adhesive on the plastic laminate.

VIII. ACKNOWLEDGEMENTS

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IX. DISTRIBUTION AND AVAILABILITY OF DETERMINATION REPORT

Copies of this complete Determination Report are currently available upon request from NIOSH, Division of Technical Services, Information Resources and Dissemination Section, 4676 Columbia Parkway, Cincinnati, Ohio 45226. After ninety (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 the report have been sent to:

1. Procraft, Spokane, Washington;

2. U. S. Department of Labor, Occupational Safety and Health Administration, (OSHA) Region X, Seattle, Washington; and

3. Washington State Department of Labor and Industries Industrial Safety and Health Agency, Olympia, Washington.

Procraft has no workers other than the owner, hence, posting of this report in a prominent place for thirty (30) days is not necessary.

TABLE I

ENVIRONMENTAL EVALUATION CRITERIA
PROCRAFT
SPOKANE, WASHINGTON
HHE 80-43

SUBSTANCE	RECOMMENDED ENVIRONMENTAL LIMIT	SOURCE	STATE OF WASHINGTON STANDARDS	PRIMARY HEALTH EFFECTS	SAMPLING MEDIUM	ANALYTICAL METHOD
Acetone	250 ppm #* 590 mg/cu m**	NIOSH(1)	1000ppm	irritation of eyes, nose, throat; headache, dizzyness, narcosis, nausea	Charcoal Tube	NIOSH P&CAM #127
Methyl Ethyl Ketone	200 ppm 590 mg/cu m	NIOSH(1)	200	Irritation of eyes, nose, throat; headache, dizzyness, narcosis, nausea	Charcoal Tube	NIOSH P&CAM #127
Naphtha (Petroleum)	350 mg/cu m (approx. 100 ppm)	NIOSH(2)		Narcosis, dizzyness, irritation of skin and mucous membranes of upper respiratory tract	Charcoal Tube	NIOSH P&CAM #127
Toluene	100 ppm 375 mg/cu m	NIOSH(3)		Mild eye irritation, headache, nausea, dizzyness and narcosis	Charcoal Tube	NIOSH P&CAM #127
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* ppm - Parts of vapor per million parts of air.
** mg/cu m - milligrams per cubic meter of air.

1. NIOSH criteria for a recommended standard ... occupational exposure to ketones - NIOSH Pub. No. 78-173
2. NIOSH criteria for a recommended standard ... occupational exposure to refine petroleum solvents - NIOSH Pub. No. 77-192
3. NIOSH criteria for a recommended standard ... occupational exposure to toluene - NIOSH Pub. No. 73-11023

TABLE 2
ACETONE, METHYL ETHYL KETONE, NAPHTHA AND TOLUENE (CONTACT ADHESIVE SOLVENTS)
AIR CONCENTRATIONS

Procraft
Spokane, Washington
HHE 80-43

WORK BEING COLLECTED	SAMPLE #	SAMPLE DATE	SAMPLE TIME MIN	SAMPLE VOLUME LITERS	ACETONE mg/m3*	MEK mg/m3	NAPHTHA mg/m3	TOLUENE mg/m3	TOTAL EQUIV** EXPOSURE OF MIXTURE TIMES THE EVALUATION CRITERIA	TIME WEIGHTED AVERAGE EXPOSURE TIMES THE EVALUATION CRITERIA
Glue, put up and trim edges, rolled adhesive on large flat surfaces	1	12/4/79	92	3.70	259	51	810	76	3.04	2.27
Laid down and trimmed flat surfaces and put up back splashes	3	12/4/79	209	7.61	117	25	526	70	1.93	
Glue, put up and trim edges	5	12/5/79	79	2.75	95	18	363	36	1.32	3.77
Rolled adhesive on large flat surfaces	7	12/5/79	26	0.95	832	168	3158	253	11.39	
Laid down and trimmed large flat surfaces. Prepared, glued and put up back splashes. Hang extra cabinents	9	12/5/79	230	9.03	277	69	1107	166	4.19	
Glue and trim edges	11	12/5/79	68	4.81	129	27	624	56	2.20	
Roll adhesive on flat surface (window open, room air cold)	13	12/5/79	27	0.83	180	48	1205	84	4.05	

*mg/m3 - milligrams per cubic meter

**When there are 2 or more substances present that have similar health effects, the exposure levels are combined and an equivalent exposure level determined. Any value greater than 1.0 indicates that this level was exceeded.