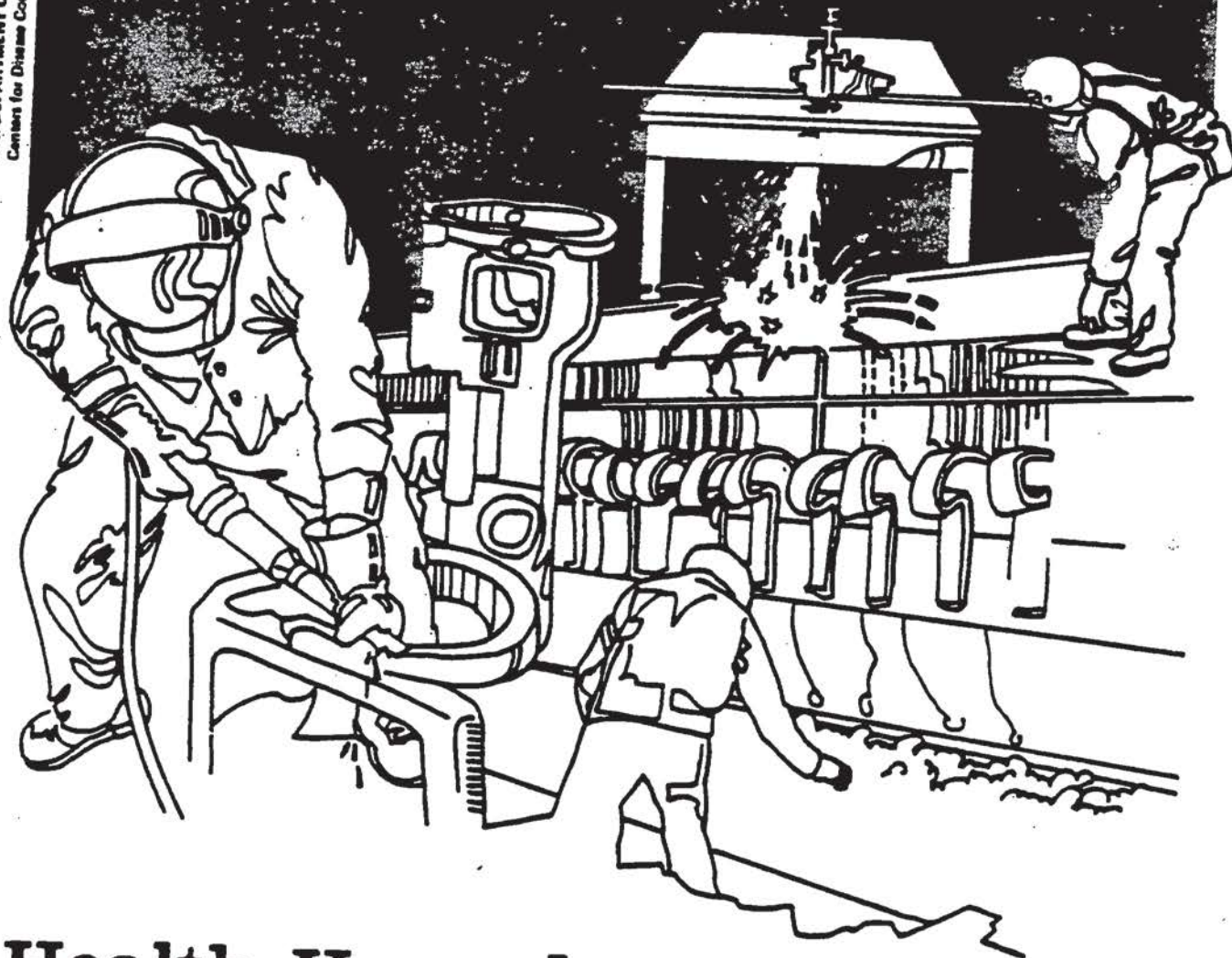


NIOSH



Health Hazard Evaluation Report

HETA 83-313-1534
MUNICIPAL COURT SECTION, CITY
OF ENGLEWOOD
ENGLEWOOD, COLORADO

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 83-313-1534
AUGUST 1985
MUNICIPAL COURT SECTION, CITY OF
ENGLEWOOD
ENGLEWOOD, COLORADO

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I. SUMMARY

On June 27, 1983, the National Institute for Occupational Safety and Health (NIOSH) received a request for a health hazard evaluation at the Municipal Court Office in Englewood, Colorado. The request stated the employees in the office had experienced respiratory disorders, eye and skin irritation, and, in the case of one employee, a low platelet count.

In April 1983, representatives from Tri-County Health Department performed an epidemiological investigation of the employees at the Municipal building. A questionnaire was administered to eight employees of the Municipal Court Office and to a matched control group of eight workers from the Accounting Office. The complaints elicited from the questionnaire included respiratory disorders and eye and skin irritation. Because the pattern of symptoms described by the Court employees suggested that the cabinet containing carbonless copy paper was the source of the problem, NIOSH analyzed the various forms used and determined that formaldehyde was one of the primary ingredient in each. The NIOSH investigator, therefore, chose to perform air sampling during various work periods which were thought to best characterize the suspected exposures.

On December 16, 1983 and March 15 and 17, 1984, NIOSH and a representative of the Tri-County District Health Department performed environmental air sampling for formaldehyde at the Municipal Court Office. A total of nineteen (19) air samples were collected for formaldehyde. The air sampling levels ranged from nondetectable (ND) to 0.05 mg/M³. NIOSH recommends that formaldehyde be controlled to the lowest feasible limit (LFL) due to its potential carcinogenicity. The current OSHA standard is 3.6 mg/M³.

NIOSH and Tri-County representatives also performed a temperature study at the office on July 6, 1983. This evaluation was performed because of the close proximity of the carbonless copy paper storage to a series of hot water boiler pipes located within one foot of the storage compartment. It was thought that this condition, temperatures as high as 180°F during the cooler months, would potentially liberate a portion of the chemicals present in the carbonless copy paper.

On the basis of the data obtained in this investigation, we determined that a potential health hazard did exist in the Municipal Court Office. Formaldehyde was the only measurable airborne substance found. It was further concluded that the elevated temperature and the close proximity of some employees' work stations to the compartment where carbonless copy paper was stored was the potential cause of the irritations experienced by the workers. Recommendations for preventing and/or eliminating future formaldehyde exposures are included in this report.

Keywords: CAS #(50-00-0), SIC 9211 (justice, public order, and safety), carbonless copy paper, formaldehyde, respiratory disorder, eye and skin irritation, platelet count, and temperature effects.

II. INTRODUCTION

On April 15, 1983 Tri-County District Health Department was requested by the City of Englewood to determine if a potential health hazard existed in their Municipal Court Section. This request came after the City received numerous complaints from employees in this area of upper respiratory disorders and eye irritation. Although these complaints had been occurring for quite some time, the recent hospitalization of one employee from the Municipal Court Section in March 1983 for a low blood platelet count convinced the City outside assistance was needed. Based on the frequency of recurrence of her disorder and on other data, this person's personal physician suggested that she might be exposed to something toxic in her work environment.

After a preliminary investigation and epidemiologic study, the Tri-County District Health Department requested the assistance of the National Institute for Occupational Safety and Health (NIOSH) on May 7, 1983. The study continued as a cooperative venture from that time.

Environmental measurements and/or samples were taken on July 6, 1983, December 16, 1983, and March 15 and 17, 1984. A letter summarizing the study findings was sent to the City of Englewood on May 15, 1984 and a meeting was held with the Municipal Court workers on July 30, 1984 to discuss NIOSH's results and recommendations.

III. BACKGROUND

The Municipal Court Section is responsible for processing all the paperwork generated by the activities in the courtroom, as well as recording the transcripts of court proceedings. In addition to the judge, this section consists of seven (7) employees whose job functions include: typing, answering phones, handling ticket payments and warrants, using a photocopier, and filing. The Municipal Court Section was moved to its current location in August 1979 after the area had been remodeled into offices and a courtroom. It had previously been a warehouse for books and paper storage.

A 3M 545 Bond Copier is located in a small room attached to the office area. This machine is used by all of the personnel in this section, and all of them change the toner when necessary. The actual forms, and major copying comes from the main print room, located in a different section of the building.

All forms in this office are on carbonless copy paper. Two large closed-door cabinets located on the south wall of the office hold the 24 different forms used by the staff. The upper shelves of the cabinets are open in back with a narrow space between them and the wall. A four-inch diameter hot water manifold is located in this space which feeds six 2-inch pipes, with manometers, which then run down to the floor behind the closed lower cabinet back. The top of the cabinet, however, runs all the way to the back wall. These pipes are part of a hot water heating system used to heat the building during the winter months. The water temperature in each of these uninsulated pipes reaches approximately 180° Fahrenheit when the system is used during the cooler months, and thus creating an extremely warm environment within these cabinets.

IV. EVALUATION DESIGN AND METHODS

A. Environmental

On April 19, 1983 the Tri-County investigator reviewed the plans used in the remodeling of the area where the Municipal Court Section is currently located to specifically determine what building materials were used and the type of ventilation system installed.

On July 6, 1983 air temperatures and relative humidity was measured by the Tri-County investigator at five locations in the Municipal Court Section using a Bendix Model 566 psychrometer. Measurements were taken in each of the cabinets where the carbonless paper/forms were stored. The other three locations were: just outside the cabinets, on the far side of the office, and in the copier room. Ambient air temperatures were also recorded. It should be noted that the heating system had already been turned off for the season at the time these measurements were taken. This particular day was chosen as it was a hot day. Afternoon readings were taken in hopes of recording maximum temperatures reached in this office.

Bulk samples of each of the carbonless copy paper forms used at the Municipal Court Office were submitted to NIOSH's laboratory for qualitative analysis. This paper was heated in a furnace which was held at approximately 80 - 82°C for 1-1 1/2 and 8 hour periods. The effluent from the furnace was sampled using charcoal tubes and N-benzylethanolamine cooled XAD-2 resin tubes. These samples were desorbed with carbon disulfide and analyzed by gas chromatography (FID). From this analysis a variety of chemicals were initially evaluated at the court building. These included aliphatic compounds (C₁₀ - C₁₄) and aromatic compounds such as alkyl substituted biphenyls, phenyl methyl benzenes, and terphenyl type compounds. Laboratory results also found formaldehyde in all of the carbonless copy paper tested. These results showed formaldehyde levels from 2.95 to 9.74 micrograms per sample in the bulk paper tested.

Air samples were collected on December 16, 1983 and March 15 and 17, 1984. A total of eleven (11) charcoal tubes plus eleven Teflon filters backed with Orbo - 43 tubes were used to evaluate all compounds other than formaldehyde.

A total of nineteen (19) air samples were collected by drawing air through impinger solution to trap the formaldehyde vapor present. The formaldehyde samples were analyzed using visible spectroscopy according to NIOSH Method 125.¹

B. Medical

The Tri-County investigators developed and administered a questionnaire to all 8 personnel in the Municipal Court Section and to an equal number of matched controls in the Finance Department. The questionnaire was composed of four major categories: personal data, medical history, occupational history, and symptomatology. The occupational history included questions on current job functions,

specific days, times of day, and estimated time frames certain functions are performed. Symptomatology involved detailed descriptions of ill-effects and their association to seasons/ weather patterns, days of the week, and times of the day when these symptoms appeared more severe. In an effort to reduce bias, each individual was interviewed by two representatives of Tri- County in a private room at the Municipal Court Section. After their interview, each person was asked not to discuss the questionnaire with the other staff members in the Municipal Court Section or other personnel in the City building in hopes of avoiding biasing the results of the study.

The Finance Department was chosen as the source of controls because it was located as far from the Municipal Court Section as possible, had a different ventilating system, handled much paper, including carbonless copy paper, and generally performs similar clerical functions. Eight (8) individuals in the same age range as the Court employees were randomly selected from all personnel in the Finance Department maintaining the same sex ratio of seven women and one man. These controls were interviewed in the same manner as were the Court workers.

V. EVALUATION CRITERIA

A. Environmental

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 solely 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.

<u>Environmental Exposure Limits</u> <u>8-Hour Time-Weighted Average (TWA)</u>			
	<u>ppm</u>	<u>mg/M³</u>	<u>Source</u>
Formaldehyde.....		LFL	(NIOSH)
	1	1.5	(ACGIH)
	3	(3.7)	(OSHA)

ppm = parts of contaminant per million parts of air.

mg/M³ = milligrams of substance per cubic meter of air.

LFL = Lowest Feasible Level

B. Medical

Thrombocytopenia (low platelet count)² causes bleeding problems. The more usual manifestation is petechial hemorrhage which represents bleeding at the capillary or postcapillary venule level. On the skin this shows up as a fine to dense bleeding into the skin without any swelling. In more severe cases there can be hemorrhage from the mucous membranes and into deep tissues. Thrombocytopenia can be due to decreased platelet production do damage to the bone marrow by radiation, toxic drugs or chemicals, vitamin deficiencies, malignancy, heatstroke, or unknown causes. All blood cells may be affected, or only platelet production. The problem could also be caused by accelerated platelet removal due to immune reactions to infections, drugs, or other immune disorders, or to non-immune destruction due to vascular problems, septicemia, or drug reactions. A third possibility is a trapping of excessive numbers of platelets in the spleen. Formaldehyde was not listed among the drugs and chemicals associated with thrombocytopenia.

C. Toxicological

Carbonless Copy Paper (CCP)^{3,4,5} has been associated with complaints of skin, eye, and upper respiratory irritation. Systemic symptoms mentioned have been headache, drowsiness, and fatigue. Factors which seem to increase the likelihood of complaints are: increased handling of CCP; work in small, poorly ventilated rooms; and warm weather. Association with a history of allergies is questionable. Most, but not all^{6,7}, of the studies aimed at identifying a specific allergen have not been able to do so. This effort is complicated by the fact that different manufacturers use somewhat different formulations.

Collecting the gasses given off by heated CCP have yielded 42 identified chemicals most of which were hydrocarbons (C₈-C₁₄) which might be slightly irritating at higher concentrations than those found.⁸ Another study⁹ identified formaldehyde as one of the gasses. A study at University of Washington¹⁰ studied the effect of breathing fumes from CCP on nasal impedance to airflow. They used hydrocarbon levels to monitor exposure. They found a statistically significant $21 \pm 5\%$ increase in nasal impedance after exposure to the CCP fumes and only a $6 \pm 13\%$ after a sham exposure. In a few persons impedance doubled or tripled. This effect could have been due to formaldehyde, which is discussed next.

Formaldehyde has a sharp odor which can be smelled at very low levels (less than one ppm (1.2 mg/M³)). The first signs or symptoms noticed on exposure to formaldehyde at concentrations ranging from 0.1 to 5.0 ppm are burning of the eyes, tearing (lachrymation), and general irritation to the upper respiratory passages. Low levels of 0.3 to 2.7 ppm have been found to disturb sleep and to be irritating to a smaller number of people.¹¹ Higher exposures (10 to 20 ppm) may produce coughing, tightness in the chest, a sense of pressure in the head, and palpitation of the heart.¹²⁻¹⁴ Exposure of 50 to 1200 ppm and above can cause serious injury such as collection of fluid in the lungs (pulmonary edema), inflammation of the lungs (pneumonitis), or death.¹⁵

Dermatitis due to formaldehyde solutions or formaldehyde containing resins is a well-recognized problem.¹⁶ After a few days of exposure, a worker may develop a sudden inflammatory (eczematous) reaction of the skin of the eyelids, face, neck, scrotum, and flexor surfaces of the arms. An eczematous reaction also may appear on the fingers, back of the hands, wrists, forearms, and parts of the body that are exposed to the rubbing of clothing. Such rashes sometimes develop after years of asymptomatic exposures.

Recent review¹⁷ of airborne formaldehyde as a factor in indoor air pollution problems suggest a wide spread in individual responses to various formaldehyde levels. A small percentage of the population show a hypersensitivity to even low levels of formaldehyde which can include both upper and lower airway symptoms. The exact mechanisms of this "allergy" are unclear.

Formaldehyde has been shown in a study conducted by the Chemical Industry Institute of Toxicology¹⁸ to induce squamous cell cancer of the nasal sinuses in both Fischer 344 rats and B6C3F1 mice. In a study by New York University, formaldehyde appears to have induced the same type of cancer in Sprague-Dawley rats.¹⁹ Although humans and animals may differ in their susceptibility to specific chemical compounds, any substance that produces cancer in experimental animals, particularly in more than one species, should be considered a cancer risk to humans. Formaldehyde also has demonstrated mutagenic activity in several test systems.²⁰

Based on these results, NIOSH recommends that formaldehyde be handled in the workplace as a potential occupational carcinogen.¹¹ Safe levels of exposure to carcinogens have not been demonstrated, but the probability of developing cancer should be reduced by decreasing exposure. An estimate of the extent of the cancer risk to workers exposed to various levels of formaldehyde at or below the current 3 ppm Occupational Safety and Health Administration (OSHA) standard²¹ has not yet been determined. In the interim, NIOSH recommends that, as a prudent public health measure, engineering controls and stringent work practices be employed to reduce occupational exposure to the lowest feasible limit. The International Agency for Research on Cancer (IARC) concurs with the recommendations.²²

VI. RESULTS AND DISCUSSION

A. Remodelling Review

No obvious hazardous building materials, such as urea formaldehyde insulation or asbestos, were noted on the blue prints and equipment specifications. It could not be determined with complete accuracy if substitutions were made at the time of actual construction. Interviews with city officials and engineers led the investigators to believe no substitutions were made. Plywood shelves and plastic laminated counter tops bonded to plywood were built into the office area in 1979.

Portions of the old ventilation system remained intact and operative after the 1979 remodeling. Data on this equipment was difficult to obtain, but some specifications came directly from the units on the roof.

There are two separate heating systems for the Municipal Court area. One system, the old system, is hot water heating through the floor. This is part of the main heating system of the entire building which is supplied from a central boiler. The other system, the new one, is a forced air system which can be heated by gas or cooled by a central unit. The old system has to be adjusted by the maintenance crew, but the new system can be adjusted manually by the workers in the area. The two heating systems are turned on at an appropriate time in the fall, and then turned off in the spring when the weather is sufficiently warm. Smoke tube tests showed that the pull of exhaust air is weak in the word processing room and near the storage cabinets.

B. Environmental

Eleven charcoal tubes plus eleven sets of Teflon filters backed up with Orbo - 43 tubes were collected for those aliphatic hydrocarbons, alkyl substituted phenyl and diphenyl type compounds detected from the bulk paper evaluation. No significant peaks were detected on any of these individual air samples, and therefore, these were eliminated from further study.

Nineteen area air samples were collected for formaldehyde in the Municipal Court Office. The majority of these samples were collected in and around the storage compartment where the carbonless copy paper was stored. Samples were taken in the evening when no activities were performed in the office; a day when there was little activity and/or use of the forms and a day when the forms were used continuously throughout the day.

The samples ran for approximately 6 hours and the results ranged from ND to 0.046 mg/M³ (refer to Table I). The highest values obtained occurred on the day when the forms were used throughout the work period. When comparing the results in Table I, it is apparent that the results have only a small difference from one sampling day to the next. There is, however, a slight increase in exposure levels on those days when carbonless copy paper is used most frequently which may suggest that the amount of activity does increase the formaldehyde concentration. NIOSH has found over the past few years with other office studies that formaldehyde levels may be as high as 0.05 mg/M³. Other sources of formaldehyde identified in these environments were cigarette smoke, glues in carpeting and fabricated materials.

Temperature and humidity readings taken by the Tri-County investigators on the afternoon of July 6, 1983 are shown in Table II. The outside temperature was 30.6° C (87° F) with a relative humidity of 36%. Although the doors to the outside were open, the highest temperature in the Municipal Court Section was 26.7° C (80° F) with a relative humidity of 29% in the right side of the forms cabinet, and the lowest was 25.0° C (77° F) with a relative humidity of 36% in the copier room.

Discussion with the Court workers indicated that during the heating season sufficient heat came from the hot water heating system that the forced air system seldom came on. NIOSH was told that the temperature in the pipes reaches approximately 180° Fahrenheit when the system is operating and that these pipes are not insulated. Therefore, based on the air temperature readings it was assumed that the temperatures in and around these areas was within 20 degrees of the internal temperature.

C. Medical

The results of the questionnaire for the affected persons indicate symptoms of an upper respiratory and eye irritation such as that caused by formaldehyde. The dermatitis noted in both the control and affected groups suggests the carbonless copy paper (CCP) was the cause.

Questionnaire results are presented in Tables V and VI. For the Court workers there was an association between symptoms and season. During the winter months when both heating systems were on symptoms were greatest. Relief was obtained by opening the outside door of the office on nice days, or leaving the area during lunch time. Also, individuals who sat closest to the forms cabinets recorded more symptoms than those sitting further away. The individual sitting directly next to the cabinets had the most symptoms, and was the one hospitalized with a low platelet count.

Five (5) of the 6 Court workers complaining of drowsiness identified it as an afternoon problem. The 3 complaints of eye irritation, the 2 complaints of sore throat, and 2 of the 3 complaints of nasal congestion were all day problems. One worker who complained of headaches, drowsiness, blurry vision, nasal congestion, and sneezing was only freed of the symptoms on weekends. Three (3) out of the 4 Financial Department workers who had headaches felt they were related to workload. One worker got dermatitis from handling CCP. The one complaint of nasal congestion was a morning problem and 1 of the eye strains and the eye irritation (in a contact lens user) were afternoon problems.

Although the numbers are too small for meaningful statistics, the Court workers had irritative symptoms compatible with formaldehyde exposure in excess of those shown by the control workers. An allergic respiratory tract sensitivity to formaldehyde is suggested for the worker with symptoms which required a weekend to subside. Another possible explanation of the symptoms could relate to insufficient outside air, particularly during the heating season. Both explanations maybe correct and interrelated. No conclusions can be reached concerning low platelet counts and workplace exposures. Challenging the individual with formaldehyde might show a relationship, but such testing is beyond the scope of this study.

VII. CONCLUSIONS

Based on the epidemiological questionnaire data and informal questioning of workers, it is felt by NIOSH that a potential health hazard did exist to the employees who work at the Municipal Court Office in Englewood, Colorado. Interaction of the two heating systems is also believed to have caused insufficient ventilation in the office.

Finally, formaldehyde liberated from the carbonless copy paper stored in the cabinets heated by one of the heating systems is the probable cause of the irritative problems found. This is based on the laboratory testing of the carbonless copy paper which demonstrated that heating the forms to levels comparable to those which might be found next to the heating pipes liberated formaldehyde and little else. Environmental results for formaldehyde showed levels slightly higher inside the cabinet than in the room in general. Levels in the room, however, were comparable to background levels found in other building studies.

VIII. RECOMMENDATIONS

1. Move the carbonless copy paper storage to the coolest part of the cabinets, or store them elsewhere.
2. Insulate the heating pipes if the paper is to be stored in its existing location. Ventilation to reduce heat build-up would also be helpful.
3. Provide for air circulation in the office even if heat is not required from the forced air system. There should be at least 8 to 10 air changes per hour in this environment.
5. Allow the most sensitive individuals to sit as far from the cabinets as possible.
6. If certain individuals continue to have skin irritation from the carbonless copy paper it is recommended that they use cotton gloves. These should be cleaned or replaced frequently.
7. Good personal hygiene is important in reducing potential exposures. This would include washing ones hands after using the carbonless paper as well as before eating meals.

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XII. DISTRIBUTION AND AVAILABILITY

Copies of this report are currently available upon request from NIOSH, Division of Standards Development and Technology Transfer, 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. Tri-County District Health Department
2. City of Englewood, Colorado
3. U.S. Department of Labor/OSHA - Region VIII.
4. NIOSH - Region VIII.
5. Colorado State Department of Health
6. State Designated Agency.

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

TABLE I
AREA AIR CONCENTRATIONS FOR FORMALDEHYDE

Municipal Court Offices
Englewood, Colorado

FORMALDEHYDE (mg/M³)

SAMPLING LOCATIONS	December 16, 1983 (No activity* - evening)	March 15, 1984 (Some activity)	March 17, 1984 (Frequent activity)
Top shelf			
Left side	0.04	0.042	0.046
3rd shelf			
Left side	0.029	0.033	0.041
Top shelf			
Right side	0.029	0.036	0.046
3rd shelf			
Right side	0.018	0.024	A D
Desk By shelves	0.026	0.024	0.031
Desk By Computers	NA	0.024	A D
Desk By Window	NA	NA	0.031
Jury Room	NA	0.020	NA

EVALUATION CRITERIA L.F.L.**
LABORATORY LIMIT OF DETECTION: 1.0 ug/sample

NA = Non-applicable (no sampling performed at location)

ND = Non-detectable

mg/M³ = milligrams of substance per cubic meter of air

ug/sample = micrograms per sample

A D = Analytical Difficulties - No Result reported

* Activity is based on the employees use of carbonless copy paper. That is, some activity means only a few forms were used versus frequent activity where numerous copies were used that day.

** Formaldehyde has been shown to cause cancer in animals. Exposure should, therefore, be controlled at the Lowest Feasible Level.

TABLE II

Afternoon Temperature and Relative Humidity Readings

Municipal Court Section, City of Englewood
Englewood, Colorado

July 6, 1983.

Location	Temperature		Wet Bulb ° F	Relative Humidity %
	Dry Bulb ° F	° C		
Outside	87	30.6	68	36
Files near forms cabinet	79	26.1	60	31
Right side of forms cabinet	80	26.7	60	29
Left side of forms cabinet	78	25.6	60	33
Desk near front counter	79	26.1	61	34
Copier room	77	25.0	60	36

TABLE III

Comparison of Demographics, Personal Habits, and Medical History
Between Municipal Court Section Workers
and Financial Department Controls

City of Englewood
Englewood, Colorado

April 1983

	Court Section		Financial Dept.		Total	
	#	%	#	%	#	%
Total Interviewed	8	100	8	100	16	100
Average Age (yrs.)	38.8		36.8		37.8	
Average months working in current location	37.5		49.6		43.6	
Current Smokers	1	12.5	3	37.5	4	25
Previous Knowledge of Problem	8	100	2	25	10	62.5
MEDICAL HISTORY						
Allergies - Any	6	75	3	37.5	9	56.3
Hay Fever	4	50	1	12.5	5	31.3
Asthma	0	0	1	12.5	1	6.3
To Perfumes	2	25	0	0	2	12.5
Total Respiratory	4	50	2	25	6	37.5
Carbonless Copy Paper (Dermal)	0	0	1	12.5	1	6.3
Medications	3	37.5	1	12.5	4	25
Foods	2	25	0	0	2	12.5
Other Significant Medical Conditions						
Any	4	50	3	37.5	7	43.8
Headaches	2	25	0	0	2	12.5
Eye Ulcerations	1	12.5	0	0	1	6.3
Other Conditions	4	50	3	37.5	7	43.8

TABLE IV

Comparison of Symptoms Between Municipal Court Section Workers
and Financial Department ControlsCity of Englewood
Englewood, Colorado

April 1983

	Court Section		Financial Dept.		Total	
	#	%	#	%	#	%
Total Interviewed	8	100	8	100	16	100
Headaches	5	62.5	4	50	9	56.3
Drowsiness	6	75	0	0	6	37.5
Dizziness or Light-headed	2	25	0	0	2	12.5
Any CNS Complaint	6	75	4	50	10	87.5
Eye Irritation	3	37.5	1	12.5	4	25
Blurry Vision	3	37.5	0	0	3	18.8
Eye Strain	0	0	2	25	2	12.5
Any Eye Complaint	5	62.5	3	37.5	8	50
Nasal Congestion	3	37.5	1	12.5	4	25
Sneezing	3	37.5	0	0	3	18.8
Nose Bleeds	1	12.5	0	0	1	6.3
Any Nasal Complaint	4	50	1	12.5	5	31.3
Sore Throat	2	25	0	0	2	12.5
Coughing	1	12.5	0	0	1	6.3
Any Throat Complaint	2	25	0	0	2	12.5
Dermatitis	1	12.5	1	12.5	2	12.5
Body Aches	1	12.5	0	0	1	6.3
Breathing Difficulties	1	12.5	1	12.5	2	12.5
Any Symptoms	6	75	6	75	12	75
No Symptoms	2	25	2	25	4	25