U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES ■ Public Health Service
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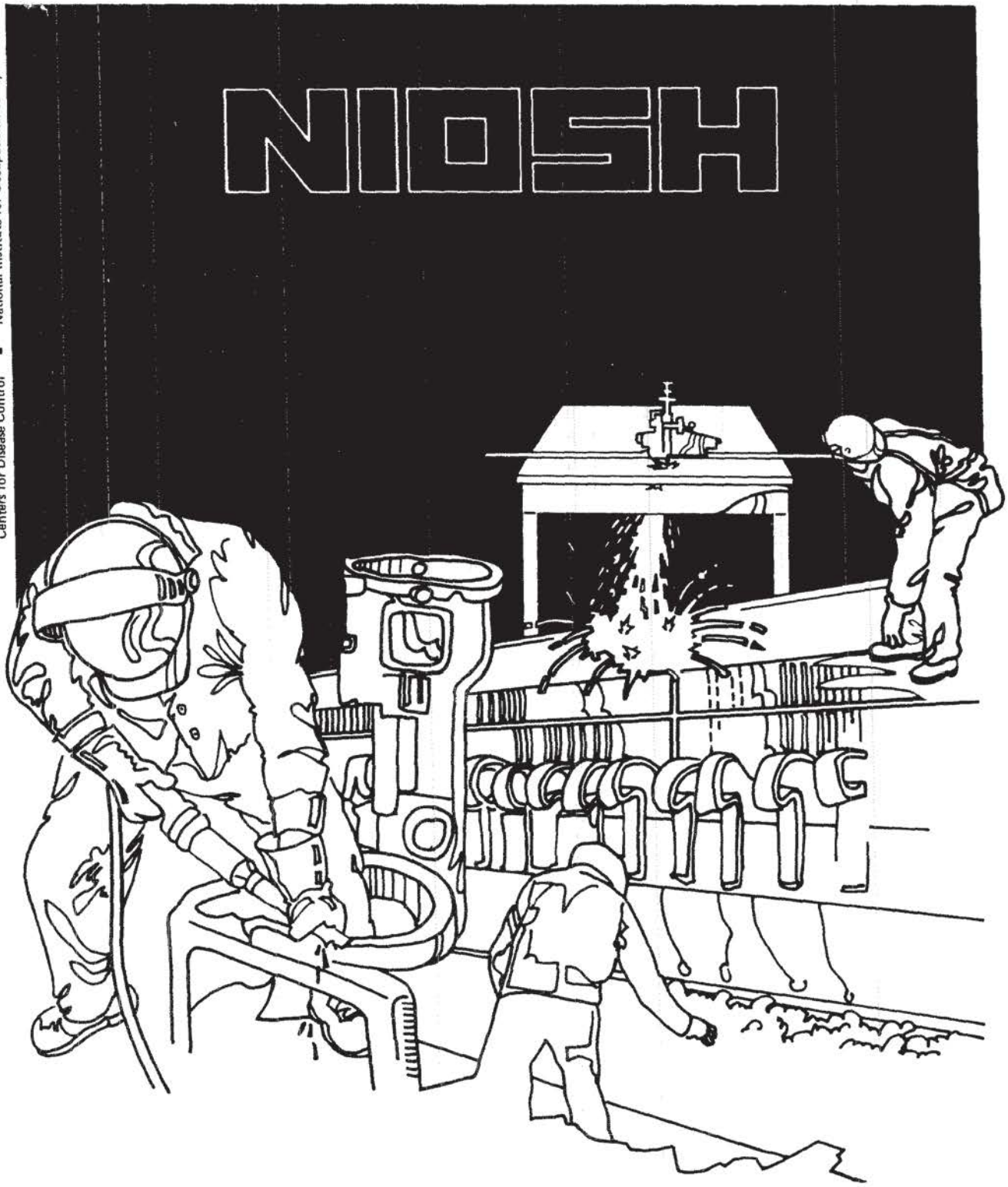
NIOSH



Health Hazard Evaluation Report

HETA 81-417-1008
NATIONAL BROADCASTING COMPANY
NEW YORK CITY, NEW YORK

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 81-417-1008
December 1981
National Braodcasting Company
New York City, New York

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I. SUMMARY

In July, 1981, the National Institute for Occupational Safety and Health (NIOSH) received a request from the administration of the National Broadcasting Company (NBC) to investigate environmental conditions at their offices on the 4th floor, 1230 Avenue of the Americas, New York City. Shortly after the offices were occupied in October 1980, employees began to experience eye irritation and dermatitis. The symptoms abated after the offices were cleaned in November 1980, but recurred within a few weeks. Employees also began to experience symptoms of nose, throat and upper respiratory tract irritation and excessive heat and cold in the offices.

Conditions in the offices were investigated previously by the Occupational Safety and Health Administration and by the New York City Department of Health. Environmental surveys were performed by two industrial hygiene groups. These surveys determined that very low concentrations of 17 contaminants were present in the offices. Exposure to such low concentrations would not be expected to cause the widespread symptoms experienced by the NBC employees. Various employees were examined by specialists in ophthamology, dermatology and/or gynecology. The medical findings were essentially negative. An engineering consultation firm performed an audit of the ventilation system and determined that the system was unbalanced and delivered only 70% of the total quantity of air that it was designed to deliver.

After reviewing previous environmental surveys, NIOSH performed a survey on August 3 and 4, 1981, to determine possible exposure to airborne ozone and formaldehyde. No ozone was detected (limit of detection = 0.05 parts per million parts of air (ppm). Formaldehyde was found in concentrations up to 0.15 ppm; the concentration of formaldehyde varied from day to day.

Although no environmental conditions could be found to entirely account for the employees' symptoms, the lack of adequate ventilation may contribute to their problems. NIOSH recommends that the ventilation system be adjusted to provide an adequate amount of fresh air to the offices and that the system be balanced to provide a uniform distribution of air to the offices.

KEYWORDS: SIC 7313 (Sale of Television and Radio Time); general offices, indoor air pollution, eye irritation, dermititis, gynecological symptoms, upper respiratory tract irritation, formaldehyde.

II. INTRODUCTION

In July, 1981, the National Institute for Occupational Safety and Health (NIOSH) received a request from the administration of the National Broadcasting Company (NBC) to investigate environmental conditions at their offices located on the 4th floor of 1230 Avenue of the Americas. NIOSH representatives visited the work site on July 16, 1981 to interview employees and to review reports of previous environmental studies performed at the office. On August 3 and 4, 1981, NIOSH performed a survey to determine concentrations of airborne formaldehyde. On September 17, 1981, following a new outbreak of symptoms, NIOSH personnel again interviewed affected employees and later reviewed a report of an audit of the ventilation system.

III. BACKGROUND

In October, 1980, NBC transferred several offices with about 180 employees from 30 Rockefeller Plaza to new quarters on the 4th floor of 1230 Avenue of the Americas. Within a few weeks of occupancy, a number of employees working in the television research section of the office began experiencing eye and skin irritation. The situation was brought to the attention of NBC's administration at the end of October, 1980.

At that time, the employees requested an investigation of the area by the Occupational Safety and Health Administration (OSHA). In addition, the company requested an investigation by the New York City Department of Health. After investigations of the office area, neither agency could determine any causative agent for the complaints. In early November, NBC employed an industrial hygiene consulting firm to investigate the situation. The consultants performed a number of approved sampling procedures and determined that low concentrations of a number of contaminants were present in the office atmosphere (see Table I). The concentrations were very low and would not be expected to produce the widespread symptoms experienced by the employees. Essentially, the environmental studies failed to determine a potential cause of the symptoms.

NBC employed two medical specialists to examine affected employees over a time span of several weeks. Volunteers were examined by a dermatologist and/or by an ophthalmologist. The results of the ophthalmologist's examinations were inconclusive. The dermatologist suggested that several of the rashes observed were possibly contact dermatitis.

In mid-November, the offices underwent a thorough cleaning, including replacement of the ceiling tiles in the reception area. These tiles showed some abrasion and may have possibly been a source of fibrous glass or mineral wool, although only trace amounts of either substance were identified in airborne samples collected in early November. In addition, the tiles contained a small amount of formaldehyde and they may, at one time, have acted as a source of formaldehyde vapor. For the few weeks following the cleaning,

symptoms of eye and skin irritation abated. By January, 1981 the eye and skin irritation recurred and employees also began to experience nose, throat and upper respiratory irritation, nausea, nosebleeds and excessive heat and cold in the office area. The affected areas appear to center around the television and radio research departments, in the center and north-center of the office complex. About 70 of the employees have had symptoms at one time or another. All of the 4th floor employees are aware of the situation and express concern about possible future health effects. About 15 employees have quit and about 5 employees have been transferred to other divisions.

In June, female employees, through discussions, became aware of possible instances of menstrual irregularities and heavier than usual menstrual flows. About 30 (of approximately 70) females of reproductive age prepared statements describing their symptoms. NBC employed a gynecologist who questioned about 30 employees and examined five volunteers. The gynecologist did not diagnose any overt illness and suggested that stress may be a contributing factor to their problems.

In June and July 1981, NBC's new compensation insurance carrier performed a second industrial hygiene survey of the area. The results of that survey, which duplicated many of the tests performed by the first industrial hygiene consulting firm, did not indicate excessive exposure to airborne contaminants.

About that time, the ventilation system was investigated by the building's management and by a consulting firm employed by NBC. The building's management reportedly found nothing unusual with the ventilation system. The results of the engineering consultant's survey indicate that the ventilation system is unbalanced and does not provide an adequate quantity of air to the 4th floor.

IV. SURVEY METHODS

A. Review of previous surveys

The situation of this survey is unique in that much of the work that NIOSH would normally have undertaken in an investigation had already been done: Two environmental surveys had been made. The ventilation system had been evaluated. Affected employees had been seen by at least one physician. At least three questionnaires had been circulated among the employees.

On July 16, 1981 a NIOSH team consisting of a physician and an industrial hygienist visited the facility, interviewed a number of employees and reviewed reports of the previous studies.

During the interviews, the employees all expressed their concerns, not so much for their present symptoms, which were mainly those of minor irritation, but for any future complications which they might develop as a result of exposure to some unknown contaminant.

Two industrial hygiene consultants had made thorough environmental surveys of the 4th floor offices. The following is a synopsis of the reports of the industrial hygiene consulting firms and an evaluation of their findings.

Table I contains a list of 21 substances. The presence of 20 of these substances was investigated and 17 of them were found to be present in the air or in bulk samples. One other substance, butyl methacrylate, is almost certainly generated during the infrequent operation of the Qwip facimile machines. In the table, "LOWEST RECOMMENDED LEVEL" means the lowest level recommended if the levels of different governmental agencies vary. "HIGHEST LEVEL FOUND" means the highest concentration which was reported by any consultant, or in the case of formaldehyde by NIOSH. Since the same substance may produce different symptoms at different concentrations, "SYMPTOMS" means the earliest symptom(s) which may be expected.

FORMALDEHYDE is a ubiquitous exposure in modern times. It may be given off by furniture, room dividers and permanent press fabrics. It is a component of automobile exhausts and cigarette smoke. On several occasions, NIOSH has measured as much as 0.03 ppm (parts per million) in outdoor New York City air. Some studies indicate that "unexposed" people may be affected by as little as 0.01 parts per million (ppm) of formaldehyde. The average person should have little or no symptoms at the concentrations found. There are reports of some individuals being sensitized to formaldehyde. Such sensitization usually requires a short exposure to a high concentration of formaldehyde or prolonged exposure to low concentrations. Several of the employees on the 4th floor have been examined by a physician and told that they are sensitized to formaldehyde. The methods used by this physician do not conform to usual medical practices for determining an individual's atopic status. NIOSH suggests that these diagnoses be confirmed. In its criteria document[1], NIOSH recommends that exposure to formaldehyde not exceed a concentration of 0.8 ppm (parts per million parts of air) for any 30 minute period. This recommendation was made primarily to avoid eye irritation. A recent NIOSH Current Intelligence Bulletin[2] identifies formaldehyde as a potential carcinogen and recommends that exposures be kept as low as possible.

OZONE is a naturally occurring constituent of the atmosphere at very low concentrations. It is generated by some types of duplicating systems and by some brands of electrostatic air purifiers. A consultant reported that the concentration of ozone on the 4th floor was less than 0.05 ppm. This means that the sampling system used had a limit of detection of 0.05 ppm., and that no concentration of ozone was detected that was equal to or greater than 0.05 ppm. NBC has installed about 40 electrostatic air purifiers in the 4th floor offices. Resampling by both the insurance carrier and by NIOSH indicated that ozone is not present in the 4th floor offices at the limit of detection (0.05 ppm).

NITRIC OXIDE & NITROGEN DIOXIDE are generated in automobile exhausts, during electric arc welding and during the storage of grain on farms. Exposure to significant concentrations of these compounds causes pulmonary edema (fluid in the lungs). These compounds are relatively unstable and were reported in very low concentrations. The industrial hygiene consulting firm which reported detecting these compounds stated that the concentrations reported probably represent "static" generated by the analytical equipment used, and not actual nitric oxide or nitrogen dioxide. It is extremely unlikely that the 4th floor employees are exposed to any detectable amounts of these compounds.

BUTYL METHACRYLATE is an extremly irritating compound which probably is generated during the operation of the two Qwip machines in the 4th floor offices. The clerical staff stated that the Qwip machines had not been used in the last six months. Since these machines are little used, it is doubtful that butyl methacrylate contributes significantly to the eye irritation problems.

HYDROCARBONS is a generic term used to describe organic compounds containing hydrogen and carbon. Heating oil is a mixture of hydrocarbons. Hydrocarbons are used as solvents in typewriter "white-out", fingernail polish, and some common household cleaners. The sampling and analytical methods used to determine hydrocarbon concentrations will identify many other organic (containing carbon) chemicals. The small airborne concentrations (less than 2 ppm) of hydrocarbons determined to be present on the 4th floor could probably be found in any home, and should not contribute to any physical discomfort.

EPICHLOROHYDRIN is used in the manufacture of plastics. It is an eye irritant at low concentrations. Its presence was determined only in one air sample, indicating that some plastic material may not have "cured" properly. The sampling and analytical methods for epichlorohydrin are those used for hydrocarbons. Since it was not identified in any other hydrocarbon sample, it is doubtful that epichlorohydrin contributes significantly to irritation on the 4th floor.

FIBROUS GLASS & ROCK WOOL are found in ceiling tiles and insulation. They are manufactured by similar processes. The main practical difference between them is that fibrous glass is harder and breaks into more discrete particles which are more easily identified by microscope than are rock wool particles. Both fibrous glass and rock wool particles can cause dermatitis by their abrasive effects on the skin. The employees complained of dusty conditions upon first moving into the 4th floor offices. Since the initial cases of dermatitis involved exposed areas of the skin, these particles are likely causes of the dermatitis. The dermatitis cases have abated, the 4th floor area has been cleaned, and only traces of fibrous glass have been identified in airborne samples collected shortly after the initial outbreaks. It is possible that fibrous glass and/or rock wool particles were present in the air or on surfaces during initial occupancy of the 4th floor, and caused the dermatitis which triggered the employees' concerns about the environment.

PARTICULATE is a generic term meaning unspecified dust. Exposure to particulate may cause eye, nose and skin irritation.

CARBON BLACK was identified in trace amounts in a particulate sample. One possible source of carbon black is toner from duplicating machines. The concentration of particulate in the air on the 4th floor is not considered to be hazardous.

TRIMELLITIC ANHYDRIDE was identified as a trace component in a bulk sample of the ceiling tile in the reception area. It is an irritant and a sensitizer. It was not identified in any air sample, and can not be considered as a probable cause of the employees' symptoms.

An unspecified CARBONYL compound was determined to be present in the ceiling tile sample. Some carbonyl compounds are irritating. No carbonyl compounds were identified in the analyses of air samples.

METHYL ETHYL KETONE (MEK), TOLUENE & HEXANE were identified in a bulk sample of the duct sealer. These chemicals are irritants. Since the cases of irritation predate the use of the duct sealer, it is doubtful that the use of the sealer is a primary source of the irritation, but it may have contributed to some of the complaints on the 4th floor.

FREON 113 was identified in small concentrations in air samples. Freon 113 is a common refrigerant and is found in some aerosol cans as the propellant. The concentration measured (0.7 ppm) is too small to produce any physiologic response.

CELLOSOLVE (ETHYLENE GLYCOL MONOETHYL ETHER) is a common solvent in cleaners and cosmetics. The concentration measured in the air samples should not cause any symptoms.

CARBON MONOXIDE is produced by combustion. The concentration found on the 4th floor (3 ppm) is normal concentration in areas where smoking is permitted, and should not cause any of the employees' symptoms.

AMMONIA is used in many cleaners. Ammonia was reported in concentrations less than 5 ppm. The limit of detection of the instrument used was 5 ppm. There is no reason to believe that ammonia is a contaminant on the 4th floor.

TOLUENE DIISOCYANATE (TDI) may be out-gassed from improperly cured plastic foams. Since TDI very rapidly dissipates, there is little reason to suspect that TDI would be a contaminant on the 4th floor. No TDI was detected (limit of detection = 0.05 ppm).

BACTERIA & MOLDS may often be a source of eye and skin irritation. No unusal types or quantities of bacteria or molds were detected using Petrie dishes as the collection medium.

B. Survey results and interpretation of findings

After reviewing the reports, NIOSH decided to investigate further the ozone and formaldehyde concentrations in the office area. The previous environmental surveys had been performed by nationally recognized groups using approved sampling and analytical methods. NIOSH believes that nothing would be gained by a second repetition of the same sampling and analytical procedures. The only questionable results concerned the formaldehyde concentrations which were detected and the lack of detectable ozone levels. As mentioned above, about 40 electrostatic precipitator air purifying units are located on the 4th floor. Several brands of electrostatic precipitators are known to generate ozone. No ozone could be detected, either in the general office air or in the air stream issuing from the units (level of detection of the direct reading detector tubes used was 0.05 ppm).

Both consultants reported formaldehyde concentrations above background levels. It has been NIOSH's experience that background formaldehyde concentrations in New York City air were about 0.01 to 0.03 ppm. As there are no known sources of formaldehyde in the offices, NIOSH decided to survey for airborne formaldehyde using a more precise sampling method.

On Monday, August 3, 1981, NIOSH personnel, using a CEA 550 monitor calibrated and specific for formaldehyde determined that formaldehyde concentrations throughout the NBC offices on the fourth floor ranged between 0.10 and 0.15 ppm. Similar concentrations were determined on the third and first floors, which are supplied with air by the same system, and on the twelfth floor which uses a different air handling system. Formaldehyde concentrations were approximately 0.03 ppm outdoors and on the fifth floor. On the following day, concentrations of formaldehyde were approximately 0.3 to 0.5 ppm in all areas on the 4th floor and on the 3rd, 12th, lobby floor and outdoors. The 5th floor was not surveyed on August 4th. In its 1977 criteria document, NIOSH recommends that occupational exposure to formaldehyde be limited to 0.8 ppm to prevent eye irritation. In 1981, NIOSH issued a Current Intelligence Bulletin recommending that formaldehyde by handled in the workplace as a potential carcinogen, and that as a prudent public health measure, occupational exposures be reduced to the lowest feasible limit.

It is interesting to note that formaldehyde concentrations were higher following the weekend when the ventilation systems were not in operation. By Tuesday, the concentrations had been reduced to background levels. The four other formaldehyde determinations, performed by consultants, were made on Tuesday, Wednesday and Thursdays, and were esentially background concentrations. The fact that the ventilation system required 24 hours to purge the area of a small concentration of formaldehyde tends to support the contention that the ventilation system provides the 4th floor with an inadequate amount of fresh air.

The surveys did not determine a possible source of the formaldehyde. As previously stated, small amounts of formaldehyde are contained in many commercial products such as cosmetics and permanent press fabrics, and are generated by the combustion of tobacco and gasoline. However, it is extremely unusual and unlikely to determine concentrations as great as 0.1 ppm in an ordinary office situation where there is no source of formaldehyde vapor. Samples of the carpeting, area dividers and ceiling tiles were analyzed by the consulting groups and (except for the original ceiling tile in the reception area) were determined not to contain measurable amounts of formaldehyde. The office furniture and machinery are "old", and were brought from the previous office where there were no problems. The office equipment consists of three duplicating machines, two Qwip facimile transmitter/receiver units and about twenty video display terminals. In addition, there is a sound recording studio with a number of tape recorders. None of this machinery uses or is known to generate formaldehyde.

The outbreaks of symptoms are sporadic and are not confined to any particular day of the week. It should be noted that no industrial hygiene surveys were conducted at the time of an illness episode. It has been suggested that

perhaps some contaminant is introduced into the office area from some unknown source(s). The ventilation system can be ruled out as a possible source of contamination since no complaints have occurred amoung the occupants of the other 7 floors served by the same ventilation unit. It is unlikely that any employee is inadvertantly introducing some contaminant into the 4th floor since the complaints seem to occur in different sections at different times.

NBC has made available the services of medical specialists in dermatology, ophthamology and gynecology available to their employees on the 4th floor. In addition, the employees are reimbursed for medical expenses incurred by consultation with personal physicians and other specialists. The physicians' evaluations were essentially negative.

Many employees have completed several questionnaires in an attempt to determine an etiology for their symptoms.

Surveys by two industrial hygiene consultants failed to determine concentrations of chemical contaminants which, either singly or in combination, could be expected to cause the degree of symptoms experienced by the employees. Examinations by medical specialists in ophthamology, dermatology and gynecology failed to determine any significant medical conditions except for some possible contact dermatitis.

The engineering consulting firm determined that the air handling system does not supply an adequate amount of air to the floor, and that the system is unbalanced. The operators of the building disagree with the findings of the survey.

In summary:

1. The 4th floor office area was vacant for approximately three years before being occupied by NBC.

2. To our knowledge, the previous tenants of the 4th floor were not similarly affected.

3. Occupants of the other floors of the building are not affected by any widespread illness.

4. The illnesses on the 4th floor began in October 1980, shortly after NBC moved to the 4th floor.

5. Most of the office machinery and furniture preceeded the occupants on the 4th floor.

6. Some of the occupants complained that conditions of the new offices were dusty and they were annoyed by dust while setting up their new work areas.

7. The original reception area tile showed wear and was composed of mineral wool.

8. The symptoms of the first illness episode was confined to eye irritation and dermatitis which may have been contributed to by dusty conditions.

9. Analysis of the original ceiling tile used in the reception area determined that it contained formaldehyde, even though the manufacturer stated that no formaldehyde was used in its manufacture and that analysis of current production samples did not contain formaldehyde. The tile was replaced with tile which does not contain formaldehyde. The question if this tile could have out-gassed formaldehyde still remains.

10. Inspections conducted by OSHA and by the New York City Department of Health soon after the first complaints failed to detect any probable source of contaminants which could be related to the illnesses.

11. An industrial hygiene survey, performed a few days after the NBC administration became aware of the first illness episode, determined trace amounts of several chemicals were present in the atmosphere in the 4th floor offices.

12. These trace amounts of chemicals could not be considered to have produced the symptoms of the employees.

13. In early November, the offices underwent a thorough cleaning and the illness and/or complaints abated for a few weeks.

14. During the Winter, the symptoms of eye irritation and dermatitis returned and the symptoms of lassitude and respiratory distress appeared.

15. An ophthamologist engaged by NBC did not diagnose any overt eye problems.

16. A dermatologist engaged by NBC diagnosed some contact dermatitis.

17. Many of the occupants of the 4th floor stated that their symptoms abated when they were out of the office on business, and during non-working hours.

18. Many of the occupants of the 4th floor were examined by their own family physicians or by specialists.

19. The occupants told these physicians that they had their symptoms mostly while at work and were told that they were affected by something at work.

20. In January/February, many of the female occupants of the 4th floor determined that their menstrual cycles had become irregular and/or that their monthly flows had changed.

21. A gynecologist employed by NBC could not diagnose any overt illness among the patients she examined and theorized that their conditions may have been caused by stress.

22. In June/July 1981, a second industrial hygiene survey was performed by a second consultant who determined approximately the same trace amounts of chemicals to be present in the atmosphere in the 4th floor.

23. In July/August 1981, an engineering consulting firm engaged by NBC, performed an evaluation of the ventilation system and determined that the 4th floor receives an amount of air approximately 30% below design requirements and that the air was distributed unevenly.

24. The water used to humidify the air supply system was found to contain no harmful organisms.

25. On August 3 and 4 1981, NIOSH performed a formaldehyde survey and determined that concentrations were less than 0.15 ppm on a Monday and were essentially background on Tuesday. These results tend to indicate that concentrations of formaldehyde build-up over the week-end when the ventilation system is not in operation and that the ventilation system is slow to remove contaminants.

26. The fact that a similar concentration of formaldehyde was determined on a floor which is serviced by a different ventilation system tends to support the belief that there is an unidentified source(s) of formaldehyde in the building.

27. No gross source for formaldehyde could be identified. The fact that similar concentrations of formaldehyde were determined to be present on other floors where there were no symptoms suggests that exposure to formaldehyde is not responsible for the incidents on the 4th floor.

28. Many occupants of the 4th floor offices are uncomfortable and worried. They continue to see and are treated by physicians.

29. At first, the illnesses were sporadic and episodic in nature. Now, the point has been reached where the office environment is suspected and/or blamed as a cause for all symptoms.

30. In October 1981, NBC moved from the 4th floor area.

V. CONCLUSIONS

Even though no environmental cause has been found for the employees' symptoms, some general observations can be made. There was an initial episode (triggering mechanism) of eye irritation and dermatitis which may have been caused by exposure to a particulate (fibrous glass or mineral wool) or to some other contaminant present at initial occupancy of the area. Symptoms abated after the area was cleaned, but recurred after a few weeks. Repeated investigations of the offices and examinations by specialists could determine nothing wrong. Occupants of one area and then another would experience similar symptoms which would disappear after a few days. Normal Winter respiratory

infections were grouped into the list of symptoms. No surveys were performed exactly at the time of an illness episode. When performed, the surveys determined low concentrations of various contaminents (see table).No explanation could be given for the presence of these low concentrations of contaminants. Social dynamic forces reinforced the idea that something was wrong with the environment in the office. Concern over the environment caused stress among the employees, which in itself, was a reinforcing factor for the illness symptoms. Two newspaper articles on the situation contributed to the employees' concerns. The idea that something was wrong with the office environment became so widespread and so deeply entrenched that it became self-fulfilling: a person became ill because of the office environment; the office environment caused people to become ill.

In October, 1981, the administration of NBC moved their personnel from the area.

VI. Recommendations

Even though exposure to contaminant(s) could not be determined to be a cause of the employees' symptoms, NIOSH believes that the ventilation system should be adjusted so that an adequate quantity of fresh tempered air is supplied to all areas of the offices.

VII. AUTHORSHIP AND ACKNOWLEDGEMENT

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VIII. REFERENCES

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2. NIOSH Current Intelligence Bulletin #34; Formaldehyde: Evidence of Carcinogenicity. DHHS (NIOSH) Publication No. 81-111.

3. NIOSH/OSHA Pocket Guide to Chemical Hazards. DHEW (NIOSH) Publication No. 78-210.

4. Threshold Limit Values for Chemical Substances and PHysical Agents. American Conference of Governmental Industrial Hygienists, Cincinnati, Ohio, 1980.

IX. DISTRIBUTION AND AVAILABILITY OF REPORT

For the purpose of informing affected employees, the employer should post this report in a prominent place(s) near where employees work for at least 30 days.

Copies of this report will be available from NIOSH, Division of Standards Development and Technology Transfer, Information Resources and Dissemination Section, 4676 Columbia Parkway, Cincinnati, Ohio 45226 for 90 days. Thereafter, copies will be available from the National Technical Information Service (NTIS), 5285 Port Royal Road, Springfield, Virginia 22161. Information concerning its availability through NTIS can be obtained from the NIOSH publication office at the above Cincinnati address.

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U.S. Dept of Health & Human Services, NIOSH, Region II, N.Y., N.Y.
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TABLE 1

POTENTIAL ENVIRONMENTAL CONTAMINANTS ON THE FOURTH FLOOR
NATIONAL BROADCASTING COMPANY
1230 AVENUE OF THE AMERICAS

SUBSTANCE	LOWEST RECOMMENDED LEVEL	HIGHEST LEVEL FOUND	SYMPTOMS
formaldehyde	0.8 ppm	0.075 ppm	eye, nose & throat irrit.
ozone	0.1 ppm	0.05 ppm*	eye, mucous membrane irrit
nitric oxide	25 ppm	0.16 ppm	eye, nose & throat irrit.
nitrogen dioxide	1 ppm (C)	0.1 ppm	cough (lower lung)
butyl methacrylate	----	-----	eye, nose & throat irrit.
hydrocarbons	----	1.8 ppm	dizziness, headache
epichlorohydrin	8 ppm	0.04 ppm	eye irr., caugh, nausea
fibrous glass	3 f/cc	trace	eye irrit., dermatitis
rock wool	10 mg/M3	" "	dermatitis, eye irrit.
particulate	10 mg/M3	0.7 mg/M3	eye irrit.
carbon black	3.5 mg/M3	trace	----------
trimellitic anhydride	0.05 mg/M3	ceiling bulk	sensitization, eye, skin irrit.
MEK toluene hexane	200 ppm 100 ppm 100 ppm	trace in duct sealer	headache, eye irrit. irr. nose & throat headache, light head
Freon 113	1000 ppm	0.7 ppm	eye irritation.
cellosolve	200 ppm	0.01 ppm	eye irritation.
carbon monoxide	35 ppm	3 ppm	headache
ammonia	50 ppm	5 ppm*	eye, nose irrit.
TDI	.005 ppm	0.05 ppm*	nose, throat irrit.
bacteria, molds	-------	usual	varies

C = Ceiling limit, never to be exceeded.
* = Limit of detection of instrument used. Airborne concentration, if any, is less than this amount.

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