HETA 91-125-2125
JULY 1991
STATE OF COLORADO
OFFICE OF THE STATE PUBLIC DEFENDER
PETROLEUM BUILDING
DENVER, COLORADO

NIOSH INVESTIGATOR:
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## I. SUMMARY

On February 22, 1991, the National Institute for Occupational Safety and Health (NIOSH) received a request from the State of Colorado, Office of the State Public Defender to conduct a health hazard evaluation (HHE) at the Petroleum Building in downtown Denver, Colorado. The requestor was seeking assistance with indoor air quality concerns in the building.

On May 16, an evaluation of the 15-story Petroleum Building was conducted. Completed questionnaires from employees in the building were collected and reviewed in advance of the site visit. Questionnaires were distributed to 70% of the building occupants and 39% of them were returned. On the floors where complaints started, responses averaged 50-60%. Workers in the building started reporting problems in September of 1990 after renovation was started in the building. The major complaints, other than comfort-related, were about itchy eyes and stuffy/runny nose. A thorough visual inspection of all the heating, ventilating, and air-conditioning (HVAC) air handling units serving the building was conducted. Also, carbon dioxide ($CO_2$), temperature, relative humidity, and smoke tube tests were conducted to evaluate efficiency of the HVAC systems. Selected employees from throughout the building were interviewed.

The ventilation in the building consisted of a central HVAC system which supplied air to the perimeter offices on the lower 14 floors, a core system which had air handling units located on each floor to supply air to the central office areas, a separate HVAC system for the penthouse (15th floor), and fan coil units located in the outside offices. The central HVAC system was in good condition, had a good maintenance program, and had an intake located on the penthouse well away from any contaminant sources. The core system had its intake on the penthouse and was well maintained; however, there appeared to be some areas on different floors where there was poor distribution of supply air. In addition, the air flow through some diffusers was quite loud. The fan coil units had heavily loaded filters and the insulation on the outside panel was badly discolored and loaded with a white powdery dust.

Temperature and humidity measurements were consistent throughout the building, ranging from 74° to 77°F and 20% to 22% RH. These values fall within the guidelines of 73° to 77°F temperature range and the 20 to 60 percent relative humidity range recommended by the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE). Carbon monoxide (CO) levels were measured throughout the building and were found to be less than 1 ppm.

Based on the building inspection and the environmental monitoring results, the investigator was unable to identify an airborne contaminant which would constitute a health hazard. However, the core ventilation system needs to be balanced and the fan coil units require extensive cleaning. Other recommendations are made in Section VII to help alleviate the employee complaints.

KEYWORDS: SIC 9222 (Legal Counsel and Prosecution), indoor air quality, indoor air pollution, IAQ.

## II. INTRODUCTION

On February 22, 1991, the National Institute for Occupational Safety and Health (NIOSH) received a request from the State of Colorado, Office of the State Public Defender to conduct a health hazard evaluation (HHE) at the Petroleum Building in downtown Denver, Colorado. The requestor was seeking assistance with indoor air quality concerns in the building. Workers on the requestor's floor (8th) began reporting problems in September, 1990, after renovation was started in the building.

On May 16, an evaluation of the 15-story Petroleum Building was conducted. Completed questionnaires from employees in the building were collected and reviewed in advance of the site visit. Questionnaires were distributed by the requestor to 70% of the building occupants and 39% of them were returned. Questionnaires were not distributed to five floors since many of these workers had only recently occupied these spaces and those on the 15th floor represented a private firm not administratively connected with the rest of the building. On the floors where complaints started, responses averaged 50-60%. The major complaints, other than comfort-related, were about itchy eyes and stuffy/runny nose. A thorough visual inspection of all the heating, ventilating, and air-conditioning (HVAC) air handling units serving the building was conducted. Also, carbon dioxide ($CO_2$), temperature, relative humidity, and smoke tube tests were conducted to evaluate efficiency of the HVAC systems. Selected employees from throughout the building were interviewed.

## III. BACKGROUND

The Petroleum building was built in 1957 and consists of 14 stories plus a penthouse, and is located in downtown Denver, Colorado. Historically the building was occupied by the Petroleum Club and is now used for office space by the State Public Defenders Office, various City and County of Denver offices, a private law firm, State Appellate Offices, and other State employees. The building currently has approximately 657 occupants, with an average of 40-50 people per floor (except #14). The building has been undergoing renovation since September, 1990. Construction and/or painting has occurred on all floors, some while there were occupants on the floor.

The ventilation in the building consisted of a central HVAC system which supplied air to the perimeter offices on the lower 14 floors (the Perimeter system), a separate HVAC for the penthouse (which was not evaluated), the Core system which had air handling units (AHUs) located on each floor to supply air to the central office areas, and fan coil units located in the outside offices. The windows in the building could also be opened to provide additional outside air.

## IV. MATERIALS AND METHODS

The NIOSH evaluation consisted of: (1) an assessment of questionnaire results from ten of the 15 floors, (2) an examination of the building's heating, ventilation and air conditioning (HVAC) systems, (3) an examination of the building for identifiable contaminant sources, (4) interviews with representatives from the building management and building employees; (5) and an environmental survey designed to assess key parameters related to the building's air quality. The specific measurements and types of samples collected in the environmental survey are detailed below.

A. Instantaneous measurements of carbon dioxide ($CO_2$) concentrations were made at several different times and locations throughout the building and outdoors. These measurements were made using a GasTech (Model RI 411) portable direct-reading $CO_2$ analyzer capable of measuring $CO_2$ concentrations from 50 to 5000 parts per million (ppm). The instrument was calibrated before use and checked against outdoor levels at various intervals throughout the workday.

B. Measurements of dry bulb temperatures and relative humidity were made at several different times and locations throughout the building and outdoors using an Extech Instruments Digital Humidity and Temperature Meter.

C. Concentrations of carbon monoxide (CO) were measured using a Draeger Model 190 Datalogger. This is a direct-reading electrochemical instrument which is specific for CO.

## V. EVALUATION CRITERIA

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 preexisting 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, such contact may increase the overall exposure. Finally, evaluation criteria may change over the years as new information on the toxic effects of an agent becomes available.

The primary sources of air contamination criteria generally consulted include: (1) NIOSH Criteria Documents and Recommended Exposure Limits (RELs), (2) the American Conference of Governmental Industrial Hygienist's (ACGIH) Threshold Limit Values (TLVs ), (3) the U.S. Department of Labor (OSHA) federal occupational health standards, and (4) the ventilation standards developed by the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE). The first three sources provide environmental limits based on airborne concentrations of substances to which workers may be occupationally exposed in the workplace environment for 8 to 10 hours per day, 40 hours per week for a working lifetime without adverse health effects. The ASHRAE guidelines specify recommended outside air ventilation rates needed to maintain acceptable indoor air quality for the majority (at least 80%) of a building's occupants.

The industrial criteria for the substances evaluated in this survey are presented in Table 1. 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 (STELs) or ceiling values which are intended to supplement the TWA where there are recognized toxic effects from high, short-term exposures. A discussion of the substances evaluated in this survey and the ASHRAE comfort and ventilation guidelines is presented below.

A. Carbon Dioxide

Carbon dioxide is a normal constituent of exhaled breath, and, if monitored in the indoor air, can often be used as a screening technique to evaluate whether adequate quantities of fresh outdoor air are being introduced into a building or work area. The outdoor, ambient concentration of $CO_2$ is about 350 ppm. Typically the $CO_2$ level is higher inside than outside (even in buildings with few complaints about indoor air quality). However, if indoor $CO_2$ concentrations are more than 1000 ppm (3 to 4 times the outside level), the building may be receiving inadequate outside air, or the air may be poorly distributed by the HVAC system. Under these conditions, complaints such as headache, fatigue and eye and throat irritation may frequently be reported. Although the $CO_2$ is not responsible for these complaints, a high level of $CO_2$ does indicate that other contaminants in the building may also be increased and could be responsible for symptoms among building occupants.[1]

B. Carbon Monoxide

Carbon monoxide can occur as a waste product of the incomplete combustion of carbonaceous fuels. Sources of carbon monoxide in indoor environments include tobacco smoke, malfunctioning or improperly vented heating systems, and the introduction of contaminated air from outside sources such as loading docks. Carbon monoxide exposure in sufficient concentrations can result in headache dizziness, drowsiness, nausea, vomiting, collapse, coma, and death.[2]

C. Temperature and Relative Humidity

The majority of references addressing temperature and humidity levels as they pertain to human health frequently appear in the context of assessing conditions in hot environments. Development of a "comfort" chart by ASHRAE presents a comfort zone considered to be both comfortable and healthful. This zone lies between 73° and 77°F (23° and 25°C) and 20 to 60 percent relative humidity.[3]

D. Ventilation

Neither NIOSH nor OSHA have developed ventilation criteria for general offices. Criteria often used by design engineers are the guidelines published by ASHRAE. Until recently, the ASHRAE Ventilation Standard 62-73 (1973) was utilized, but recommendations were based on studies performed before the more modern, airtight office building became common. These older buildings permitted more air infiltration through leaks and cracks around windows and doors, and through floors and walls. Modern office buildings are usually much more airtight and permit less air infiltration. Due to the reduced infiltration, ASHRAE questioned whether the 1973 minimum ventilation values assured adequate outdoor air supply in modern, airtight buildings.

The minimum rate of outside air permitted under the new ASHRAE Standard 62-1989 is 20 cfm/person for general office areas.[4] For smoking lounges, ASHRAE Standard 62-1989 recommends an outside air supply rate of at least 60 cfm/p. The basis of the outside air supply rates recommended by ASHRAE is for maintaining an indoor air quality that is considered acceptable by at least 80% of the building's occupants. However, unless referenced or specified by local building codes, building owners are not legally required to comply with these ASHRAE Standards. Most building codes refer to an earlier version of this standard (ASHRAE Standard 62-73) which was intended to conserve energy more so than promoting adequate indoor air quality.

E. Environmental Tobacco Smoke (ETS)

Environmental tobacco smoke is a well-recognized health hazard, associated with effects ranging from eye irritation to lung cancer.[5-10] NIOSH has no specific position on workplace exposure to environmental tobacco smoke, but the NIOSH position on carcinogens is that exposure should be reduced to the lowest feasible level. Since cigarette smoke is carcinogenic, it follows that involuntary exposure to it should be reduced to the lowest feasible level. The Surgeon General's 1986 report on smoking, "The Health Consequences of Involuntary Smoking," states that "simple separation of smokers and non-smokers within the same air space may reduce, but does not eliminate, the exposure of non-smokers to environmental tobacco smoke."[9]

The Federal Occupational Safety and Health Administration (OSHA) currently has no specific regulation regarding exposure to environmental tobacco smoke.

## VI. RESULTS AND DISCUSSION

A. HVAC System Inspection

The Perimeter HVAC system is a constant volume system which was in good condition, had a good maintenance program, and had an intake located on the penthouse well away from any contaminant sources. There was a small amount of water in the HVAC room due to a pipe leak but it did not appear to be significant. The intake filters were fiberglass with a particulate efficiency rating of 40%. The filters were replaced every 3 months. The central HVAC system was on an economizer cycle which at an outside temperature of 52°F started closing the outside dampers. At 70°F the outside dampers were totally closed. The building management estimates that if the outside dampers are totally closed, there is a minimum of 10% of outside air entering the system due to leakage. The HVAC system is shut down in the evening from 9:00 pm until 6:00 am the next day and on the weekend 3:00 pm on Saturday until 6:00 am Monday.

The Core ventilation is a constant volume system which had its intake on the penthouse, was well maintained, but there appeared to be some areas on different floors where there was poor distribution. This was particularly true on the 9th and 11th floors. In addition, the air flow through some diffusers was quite loud. Noise complaints due to the ventilation system were most frequently reported on the 3rd, 6th, and 2nd floors (listed in decreasing order of frequency). The Core system was divided into 5 zones which included multiple floors in each zone. Each floor was

divided into quarters which could include different zones. For example, Zone 1 included part of floors 7-11 while Zone 2 included the other parts of these same floors. Cooling was controlled by zone. Therefore on every floor (except the penthouse) there was air supplied from a variety of sources including the Perimeter HVAC system, the Core system from two different zones, and the fan coil units in the outer offices.

Some of the fan coil units had heavily loaded filters and the fiberglass insulation on the outside panel was discolored and loaded with a white powdery dust (this was found in most of the units on the 8th floor). The dust appeared to be fine plaster dust from the recent construction activity. Under the plaster dust, the insulation was badly discolored and in poor condition. It was difficult to determine if the discoloration was due to mold growth. Some of the drip pans had rust and may not have been draining well. Therefore, there appeared to be the possibility of panel insulation becoming wet due to condensation.

B. Environmental Survey Results

The carbon dioxide ($CO_2$) levels ranged from 350 up to 800 ppm throughout the building during the day (May 16). Outside levels stayed fairly constant at 300 to 325 ppm of $CO_2$. The highest $CO_2$ levels measured (800 ppm) were in a central office area on the 9th floor which was supplied air by the Core system. There was very little air movement in this area and the temperature was 77°F. However, no $CO_2$ levels were measured above 1000 ppm anywhere in the building.

Likewise, temperature and humidity measurements were consistent throughout the building, ranging from 74° to 77°F and 20% to 25% RH. These values fall within the guidelines of 73° to 77°F temperature range and the 20 to 60 percent relative humidity range recommended by ASHRAE.[3]

Carbon monoxide (CO) levels were measured throughout the building and were found to be less than 2 ppm. CO levels measured outside in the driveway where cars are parked were quite low, and did not exceed 5 ppm.

C. Results of Interviews, Questionnaires, and Investigation of Areas

Prior to NIOSH's arrival, questionnaires had been circulated by the requestor. The questionnaires used were those contained in the NIOSH Guidance for Indoor Air Quality Investigations.[1] The results of these questionnaires are summarized in Table 2. Typically, of the people responding to the questionnaire (39%), 80-90% of them had complaints about the building. The majority concerned comfort; it was too hot, too cold or there was a lack of air circulation (stuffy feeling). The major health complaints were stuffy/runny nose, itchy/watery eyes (particularly on the 8th floor), and headache. Most occupants thought the problem occurred all day and on a daily basis.

Smoking was not allowed on floors 2, 3, 6, 7, 9-12, 14, and only in a small area on 8. These were State leased floors where a no-smoking policy was in effect. The other areas of the building allowed smoking. Smoke from the smoking areas could move into the non-smoking areas via the elevator shafts, stairwells, and the common return air plenums.

The elevators and stairwells acted as a conduit of air between all floors. For example, while on the 8th and 9th floors, one could easily smell the fresh paint from the subbasement and 1st floor if you were near the elevators. Therefore, any construction in the building would be perceived by occupants throughout the building. Likewise, any construction related dusts or solvents would be transported to the other floors.

The pesticides Dursban$^{R}$ L.O. and Tempo$^{R}$ 20WP are applied monthly for the control of cockroaches and small bugs. These pesticides are sprayed only in the subbasement area. There was a one-time spraying for cockroaches on the 8th floor in November of 1989 to control bugs that were brought in when the occupants moved in. The complaints in the building have not been associated by either the employees or management representatives with the pesticide applications.

## VII. CONCLUSIONS

In general, measurements of ventilation system parameters (i.e., $CO_2$, temperature, and relative humidity) did not reveal any particular problems with the system on the day examined. The exception to this were areas of inadequate air distribution in the Core AHU, particularly on the 9th and 11th floors. The combination of ventilation systems in the building is confusing and undoubtedly makes it difficult to balance. There were several areas near the Core fans where noise levels at certain diffusers was high. This was particularly true on the 3rd and 6th floors.

Many of the complaints in the building are undoubtedly related to the construction in the building over the past two years. The fan coil units along the 8th floor contained a substantial amount of plaster dust from the last floor construction project. It is always a prudent approach to remove occupants from an area, if possible, during renovation. Construction on other floors is easily perceived on all floors due to the movement of construction related odors through the elevator shafts and stairwells. Even if the amounts of vapors and dusts that reach the other floors is small, the occupants may associate problems with the odors.

The fan coil units represent a source of contamination that needs cleaning. There is certainly a large amount of construction related dust deposited in these units. Since some of these units are blocked by desks and other office furniture, the filters may not be replaced very often. The insulation inside the units has probably been there since the building was built in 1957. Consequently it is quite dirty and generally in poor condition.

The majority of the building does not allow smoking, yet there are enough areas where environmental tobacco smoke (ETS) can get into non-smoking areas. ETS is a known carcinogen and is a strong irritant and allergen. Exposure to ETS should be reduced to the lowest amount feasible.

## VIII. RECOMMENDATIONS

1) The fan coil units should be thoroughly cleaned. This should include vacuuming to remove all dust, the replacement of all filters now plus periodic replacement (include on the same maintenance schedule as the main HVAC system filter replacement), the removal and replacement of all insulation in the fan coil units, the

clean-up and check of working order of the drains in the condensation drip pans, and the removal of office furniture from in front of the units to insure routine maintenance can be performed.

2) Check the balancing on the Core AHUs, particularly on the 9th and 11th floors to insure proper air distribution to all occupied spaces. A qualified ventilation consultant should be hired for this purpose.

3) The Perimeter HVAC system was in good condition. The routine maintenance program should be continued. Particular attention should be paid to eliminating any water leaks around the HVAC housing. The outside air dampers should be adjusted so that there is a minimum of 20 cfm/person of outside air during all phases of the economizer cycle. It is very likely that a deficiency of outside air will occur when the outside temperature is consistently above 70NF.

4) An effort should be made to reduce the noise level at the air diffusers on the Core AHU, particularly on floors 3-6. The ventilation consultant should also be asked to address this problem.

5) In accordance with Department of Health and Human Services recommendations, no smoking should be allowed in the building. This should help reduce irritant and odor complaints associated with environmental tobacco smoke.

## IX. REFERENCES

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10. National Research Council Committee on Indoor Air Quality, "Policies and procedures for control of indoor air quality", National Academy Press, Washington, DC, 1987, 75 pages.

## XI. AUTHORSHIP AND ACKNOWLEDGMENTS

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1. Chief Appellate Deputy, Office of the State Public Defender, State of Colorado.
2. Safety and Loss Control Representative, Division of Risk Management, State of Colorado
3. U.S. Department of Labor/OSHA - Region VIII.
4. NIOSH, Region VIII
5. Colorado State Health Department, Denver, Colorado

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 1
ENVIRONMENTAL CRITERIA FOR SELECTED SUBSTANCES
PETROLEUM BUILDING
DENVER, COLORADO
JUNE 1991

| SUBSTANCE | OSHA PEL | NIOSH REL | ACGIH TLV |
|---|---|---|---|
| Carbon Dioxide | 10,000 ppm<br>8-hr TWA<br>30,000 ppm<br>STEL | 10,000 ppm*<br>8-hr TWA<br>30,000<br>ceiling<br>(10 min) | 5,000 ppm<br>8-hr TWA<br>30,000 ppm<br>STEL |
| Carbon Monoxide | 35 ppm<br>8-hr TWA<br>200 ppm<br>ceiling<br>(no minimum time) | 35 ppm<br>8-hr TWA<br>200 ppm<br>ceiling<br>(no minimum time) | 50 ppm<br>8-hr TWA<br>400 ppm<br>STEL<br>STEL |

Abbreviations and Key
TWA - Time-weighted average concentration
ppm - Parts of contaminant per million parts of air
STEL - Short-term exposure limit; 15-minute TWA exposure
*1000 ppm is used as a guideline for availability of fresh air in office environments.

TABLE 2
RESULTS OF SELF-ADMINISTERED QUESTIONNAIRE FOR INDOOR AIR
PETROLEUM BUILDING
DENVER, COLORADO
JUNE 1991

| | FLOOR NUMBER | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 2nd | 3rd | 6th | 7th | 8th | 9th | 10th | 11th | 12th | 13th |
| % OF OCCUPANTS RESPONDING | 55 | 43 | 34 | 30 | 54 | 49 | 39 | 68 | 43 | 36 |
| COMPLAINTS | | | | | | | | | | |
| I have a complaint | 88 | 86 | 90 | 43 | 80 | 83 | 90 | 100 | 87 | 68 |
| Temperature too cold | 58 | 27 | 43 | 0 | 5 | 13 | 19 | 0 | 13 | 23 |
| Temperature too hot | 29 | 68 | 29 | 14 | 30 | 71 | 81 | 66 | 53 | 18 |
| Lack of air circulation | 29 | 59 | 24 | 43 | 65 | 75 | 62 | 33 | 67 | 32 |
| Noticeable odors | 17 | 5 | 19 | 0 | 30 | 4 | 10 | 0 | 7 | 9 |
| Dust in the air | 13 | 27 | 10 | 0 | 45 | 17 | 29 | 0 | 27 | 9 |
| Disturbing noises | 38 | 64 | 48 | 14 | 15 | 4 | 14 | 0 | 20 | 0 |
| Other | 0 | 0 | 0 | 0 | 10 | 8 | 5 | 0 | 20 | 0 |
| HEALTH PROBLEMS OR SYMPTOMS | | | | | | | | | | |
| Sneezing | 13 | 27 | 19 | 14 | 10 | 13 | 5 | 0 | 40 | 0 |
| Itchy, watery eyes | 17 | 14 | 10 | 0 | 55 | 21 | 19 | 0 | 13 | 18 |
| Stuffy, runny nose | 25 | 32 | 33 | 29 | 35 | 29 | 29 | 33 | 13 | 23 |
| Headache | 17 | 27 | 33 | 14 | 25 | 21 | 24 | 0 | 33 | 5 |
| Sore throat | 4 | 5 | 5 | 0 | 0 | 17 | 10 | 33 | 0 | 5 |
| Cough | 0 | 0 | 0 | 14 | 5 | 0 | 5 | 0 | 0 | 9 |
| Chest congestion | 5 | 6 | 0 | 0 | 5 | 0 | 0 | 0 | 0 | 0 |
| Other | 13 | 14 | 33 | 14 | 25 | 25 | 24 | 33 | 20 | 23 |
| OCCURRENCE | | | | | | | | | | |
| Morning | 8 | 18 | 10 | 0 | 0 | 4 | 19 | 0 | 13 | 0 |
| Afternoon | 4 | 14 | 19 | 0 | 15 | 21 | 29 | 33 | 27 | 9 |
| All day | 33 | 36 | 48 | 43 | 45 | 58 | 67 | 66 | 33 | 23 |
| Daily | 13 | 32 | 33 | 14 | 35 | 33 | 48 | 0 | 27 | 32 |
| No trend | 25 | 14 | 19 | 0 | 25 | 13 | 10 | 0 | 20 | 18 |

TABLE 2 (Continued)
RESULTS OF SELF-ADMINISTERED QUESTIONNAIRE FOR INDOOR AIR
PETROLEUM BUILDING
DENVER, COLORADO
JUNE 1991

| | FLOOR NUMBER | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 2nd | 3rd | 6th | 7th | 8th | 9th | 10th | 11th | 12th | 13th |
| OTHER FACTORS | | | | | | | | | | |
| Smokers | 0 | 9 | 0 | 57 | 5 | 0 | 19 | 33 | 13 | 27 |
| Allergies | 8 | 18 | 24 | 14 | 25 | 8 | 24 | 0 | 13 | 9 |
| Contact wearers | 46 | 36 | 43 | 0 | 25 | 42 | 10 | 0 | 20 | 14 |
| VDT users | 46 | 41 | 43 | 86 | 35 | 29 | 81 | 66 | 93 | 14 |

COMMENTS

Questionnaires were sent to 459 of the current population of 657. Thirty-nine (39%) of those receiving questionnaires returned them. Numbers above reflect the percentage of floor occupants responding positively to the question.