HETA 92-152-2214
NIOSH INVESTIGATOR:
MAY 1992 Charles McCammon, Ph.D., CIH
MESA COUNTY COURTHOUSE
GRAND JUNCTION, COLORADO

## I. SUMMARY

On November 17, 1991, the National Institute for Occupational Saf Health (NIOSH) received a request from the Facilities Manager of County Support Services Department in Grand Junction, Colorado to conduct a health hazard evaluation (HHE) at the Mesa County Court and Annex in Grand Junction, Colorado. The requestor was seeking assistance with indoor air quality concerns in the building.

On April 2, 1992, an evaluation of the 3-story Courthouse and Ann building was conducted. The NIOSH evaluation consisted of: (1) assessment of questionnaire results from building employees, (2) examination of the building's heating, ventilation and air condit (HVAC) systems, (3) an examination of the building for identifiab contaminant sources, (4) interviews with representatives from the building management and building employees; (5) and an environmen survey designed to assess key parameters related to the building' quality including carbon dioxide ($CO_2$), temperature, humidity, ca monoxide, and smoke tests for air flow.

On the self-administered questionnaire, there was a response rate (108 of 130 occupants). Of those responding to the questionnaire average of 55% complained it was too cold, 63% too hot, and 65% t was stuffy. Headaches was the #1 symptom reported with 73% repor headaches in the last year, 72% thought they were related to work 56% saying they went away within 1 hour after work, and 64% repor they had had a headache in the last week. The next most commonly reported symptom (within the last year) was burning or irritated (65%), nasal congestion (52%), and sinus infection (42%). Forty- reported they had had a physician diagnoses of sinusitis. Sixty- rated the air quality as poor and the majority did not have a cle picture of any seasonal variation in the air quality. Most of th respondents (73%) reported they had no allergies, rated the workp health and safety conditions as average (55%), thought their jobs somewhat stressful (56%), but were either very satisfied (49%) or somewhat satisfied (51%) with their job. The vast majority of wo reported they had no control of their environment (80%).

The HVAC in the old Courthouse was a constant volume system which operated on 100% outside air. Few problems, other than ones rela air distribution, were found in this building. Most of the compl were from the Annex building which had a central HVAC system whic provided constant temperature air to variable air volume (VAV) bo throughout the building. The Annex also had a number of fan coil and four dedicated HVAC systems for the courtrooms. Few complain noted from those areas serviced by the dedicated units.

The carbon dioxide ($CO_2$) levels ranged from 425 up to 875 ppm thr the building during the visit on April 2. The weather was warm, 70-76-F, and the VAVs were calling for cooling most of the day an economizer cycle had the outside air dampers fully open. Outside levels stayed fairly constant at 325 to 350 ppm. No $CO_2$ levels w measured above 1000 ppm anywhere in the building. Temperature an humidity measurements were consistent throughout the building, ra from 72- to 79-F and 17% to 20% RH. Most of these values fall wi the guidelines of 73- to 77-F temperature range and the 20 to 60 percent relative humidity range recommended by ASHRAE. In genera humidity stayed just below the 20% level for the day and temperat averaged about 76-F. The highest temperatures were found in the afternoon in the Assessor's office. Carbon monoxide (CO) levels measured throughout the building and were found to be less than 1 Generally, there was little return air available throughout the A and times when inadequate amounts of outside air were supplied to occupied spaces.

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, sev deficiencies in the ventilation system were noted. Recommendatio are made in Section VIII to help alleviate the employee complaint

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

## II. INTRODUCTION

On November 17, 1991, the National Institute for Occupational Saf Health (NIOSH) received a request from the Facilities Manager of County Support Services Department in Grand Junction, Colorado to conduct a health hazard evaluation (HHE) at the Mesa County Court and Annex in Grand Junction, Colorado. The requestor was seeking assistance with indoor air quality concerns in the building. Emp in the building had been complaining of itchy watery eyes, chroni problems, headaches, and other problems within the last year.

On April 2, 1992, an evaluation of the 3-story Courthouse and Ann building was conducted. During the visit the investigator talked county administrative personnel, affected employees, and supervis affected employees. Complaint questionnaires had been distribute all employees in the old Courthouse building and in the Annex. T results from the questionnaires had been tabulated prior to the s visit. The results were used to target the employee groups with most complaints. Generally, this included most employees in the and very few in the old Courthouse building. Therefore most of t visit centered around the Annex building. Responses were receive 83% of the building occupants. The major complaints, other than comfort-related, were about headaches, burning or irritated eyes, nasal congestion. A thorough visual inspection of the heating, ventilation, and air-conditioning (HVAC) units serving the buildi conducted. Also, carbon dioxide ($CO_2$), temperature, relative hum and smoke tube tests were conducted to evaluate efficiency of the systems.

## III. BACKGROUND

The old Mesa County Courthouse was built in 1918 and the Annex wa in two phases, starting in the late 1960s. The Annex consists of stories plus a basement. Each floor of the Annex has been remode over the last five years. Part of the remodeling involved the ad of separate HVAC systems to the four courtrooms. The employees r that they have had problems with mucous membrane irritation and headaches for the last 2-3 years. The new facilities manager has aware of the complaints since about September of 1991.

The ventilation in the old building consisted of a central consta volume HVAC system which operated on 100% outside air at all time Annex building had several systems which included a main Carrier which supplied constant temperature air to most of the building. different zones in the building were controlled by variable air v (VAV) systems. Fan coil units were also used to supply air to ce parts of the building. Each of the four main courtrooms had dedi constant volume HVAC systems. A small HVAC unit supplied air to foyer area between the two buildings. This unit is old and is sc to be replaced soon. For the Carrier unit, cooling was provided indirect chilled water coil and heating was provided from hot wat heated in a a gas-fired boiler. The Carrier unit is equipped wit economizer which adjusts the outside damper opening depending on outside air temperature. The return air fans on the unit had bee down.

The county has hired a number of environmental consultants since October of 1991 in response to the workers' complaints. These consultants have monitored extensively for formaldehyde, carbon monoxide (CO), carbon dioxide ($CO_2$), oxygen, and combustible gase Other monitoring has been conducted for fibers and total organic Only the formaldehyde levels were found to be elevated in one te using detector tubes. A retest with a more sensitive and specif method for formaldehyde found no detectable levels. One of the for total organic revealed an elevated peak which was at first t to belong to a pesticide. Further analysis was able to eliminat pesticides as a possibilty.

## IV. MATERIALS AND METHODS

The NIOSH evaluation consisted of: (1) an assessment of questionna results from building employees, (2) an examination of the building heating, ventilation and air conditioning (HVAC) systems, (3) an examination of the building for identifiable contaminant sources, ( interviews with representatives from the building management and bu employees; (5) and an environmental survey designed to assess key parameters related to the building's air quality. The questionnair was a new one which had been developed by a local county health dep in the Denver area. A copy of the questionnaire is in Appendix 1. specific measurements and types of samples collected in the enviror survey are detailed below.

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

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

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

## V. EVALUATION CRITERIA

A number of published studies have reported high prevalences of syr among occupants of office buildings.[1-5] NIOSH investigators have completed over 700 investigations of the indoor environment in a wi variety of settings. The majority of these investigations have bee conducted since 1979.

The symptoms and health complaints reported by building occupants h been diverse and usually not suggestive of any particular medical diagnosis or readily associated with a causative agent. A typical spectrum of symptoms has included headaches, unusual fatigue, varyi

degrees of itching or burning eyes, irritations of the skin, nasal congestion, dry or irritated throats and other respiratory irritati Typically, the workplace environment has been implicated because wo report that their symptoms lessen or resolve when they leave the bu

Scientists investigating indoor environmental problems believe that are multiple factors contributing to building-related occupant complaints.[6,7] Among these factors are imprecisely defined characteristics of heating, ventilation, and air-conditioning (HVAC systems, cumulative effects of exposure to low concentrations of mu chemical pollutants, odors, elevated concentrations of particulate microbiological contamination, and physical factors such as thermal comfort, lighting, and noise.[8-13] Reports are not conclusive as to increases of outdoor air above currently recommended amounts (>15 c feet per minute per person) are beneficial.[14,15] However, rates lowe these amounts appear to increase the rates of complaints and sympto some studies.[16,17] Design, maintenance, and operation of HVAC systen critical to their proper functioning and provision of healthy and thermally comfortable indoor environments. Indoor environmental pollutants can arise from either outdoor sources or indoor sources.

There are also reports describing results which show that occupant perceptions of the indoor environment are more closely related to t occurrence of symptoms than the measurement of any indoor contamina condition.[19-21] Some studies have shown relationships between psychological, social, and organizational factors in the workplace occurrence of symptoms and comfort complaints.[21-24]

Less often, an illness may be found to be specifically related to something in the building environment. Some examples of potential building-related illnesses are allergic rhinitis, allergic asthma, hypersensitivity pneumonitis, Legionnaires' disease, Pontiac fever, monoxide poisoning, and reaction to boiler corrosion inhibitors. T first three conditions can be caused by various microorganisms or c organic material. Legionnaires' disease and Pontiac fever are caus Legionella bacteria. Sources of carbon monoxide include vehicle ex and inadequately ventilated kerosene heaters or other fuel-burning appliances. Exposure to boiler additives can occur if boiler steam used for humidification or is released by accident.

Problems NIOSH investigators have found in the non-industrial indoo environment have included poor air quality due to ventilation syste deficiencies, overcrowding, volatile organic chemicals from office furnishings, machines, structural components of the building and co tobacco smoke, microbiological contamination, and outside air pollu comfort problems due to improper temperature and relative humidity conditions, poor lighting, and unacceptable noise levels; adverse ergonomic conditions; and job-related psychosocial stressors. In m cases, however, no cause of the reported health effects could be determined.

Standards specifically for the non-industrial indoor environment do exist. NIOSH, the Occupational Safety and Health Administration (O and the American Conference of Governmental Industrial Hygienists ( have published regulatory standards or recommended limits for occup exposures.[25-27] With few exceptions, pollutant concentrations observ the office work environment fall well below these published occupat standards or recommended exposure limits. The American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) has published recommended building ventilation design criteria and ther comfort guidelines.[28-29] The ACGIH has also developed a manual of guidelines for approaching investigations of building-related compl that might be caused by airborne living organisms or their effluent

Measurement of indoor environmental contaminants has rarely proved helpful, in the general case, in determining the cause of symptoms complaints except where there are strong or unusual sources, or a p relationship between a contaminant and a building-related illness. However, measuring ventilation and comfort indicators such as carbo dioxide ($CO_2$), and temperature and relative humidity, is useful in early stages of an investigation in providing information relative proper functioning and control of HVAC systems. The basis for the measurements made in this investigation are presented below.

A. Carbon Dioxide ($CO_2$)

$CO_2$ is a normal constituent of exhaled breath and, if monitored be used as a screening technique to evaluate whether adequate quantities of fresh air are being introduced into an occupied s The ASHRAE Standard 62-1989, Ventilation for Acceptable Indoor Quality, recommends outdoor air supply rates of 20 cubic feet p minute per person (cfm/person) for office spaces and conference rooms, 15 cfm/person for reception areas, and 60 CFM/person for smoking lounges, and provides estimated maximum occupancy figur each area.[28]

Indoor $CO_2$ concentrations are normally higher than the generall constant ambient $CO_2$ concentration (range 300-350 ppm). When i $CO_2$ concentrations exceed 1000 ppm in areas where the only know source is exhaled breath, inadequate ventilation is suspected. Elevated $CO_2$ concentrations suggest that other indoor contamina may also be increased.

B. Temperature and Relative Humidity

The perception of comfort is related to one's metabolic heat production, the transfer of heat to the environment, physiologi adjustments, and body temperatures. Heat transfer from the boc the environment is influenced by factors such as temperature, humidity, air movement, personal activities, and clothing. ANSI/ASHRAE Standard 55-1981 specifies conditions in which 80% more of the occupants will find the environment thermally comfortable.[29]

C. Carbon Monoxide

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

E. Environmental Tobacco Smoke (ETS)

Environmental tobacco smoke is a well-recognized health hazard, associated with effects ranging from eye irritation to lung cancer. [32-37] NIOSH has recently published a Current Intelligenc Bulletin (CIB #54) on Environmental Tobacco Smoke in the Workp Lung Cancer and Other Health Effects.[38] This document summariz literature on ETS and concludes that ETS meets the OSHA criteri potential occupational carcinogen and, therefore, exposures to should be reduced to the lowest feasible concentration. The do further recommends that "Employers should minimize occupationa exposure to ETS by using all available preventative measures."

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 central HVAC system in the old Courthouse appeared to be in condition. The system operated on 100% outside air at all time employee questionnaires revealed very few reported problems in Courthouse.

Maintenance of the various HVAC units in the Annex (as well as Courthouse) appeared to be quite good. In fact, the county hac implemented a new preventive maintenance program which was quit impressive. The old HVAC unit, which provided air for the spac between the Annex and the old Courthouse, used evaporative coo gas heat. Measureable levels of CO had been found near this un the heater was operating. The unit shows signs of water leaks possibly mold growth. This unit is scheduled to be replaced so

The Carrier unit, which provides the bulk of outside air to the was in good condition except that the return air fans has been disconnected. The lack of substantial return air was obvious d various floors when smoke tests were conducted. The Carrier un

on an economizer cycle so the outside air dampers close down whe temperatures are too cold or too hot. The day was mild on April the dampers were open all the way. Cold and/or hot water are pr to the VAVs and fan coil units from a boiler room which is locat the roof (cold water only is provided to the Carrier unit). The Carrier unit provides constant temperature air to a series of va air volume (VAV) units throughout the Annex. Most of the high complaint areas were ones serviced by the Carrier unit and with Some areas, such as the bathrooms in the Assessor's office, had adequate air supply or exhaust.

The new Trane units are self-contained, providing cooling and he needed. Few complaints were received from areas that were servi these units.

B. Environmental Survey Results

The carbon dioxide ($CO_2$) levels ranged from 425 up to 875 ppm throughout the building during the visit on April 2. The weathe warm, 70-76°F, the VAVs were calling for cooling most of the day the economizer cycle had the outside air dampers fully open. Ou $CO_2$ levels stayed fairly constant at 325 to 350 ppm. No $CO_2$ leve were measured above 1000 ppm anywhere in the building. Likewise temperature and humidity measurements were consistent throughout building, ranging from 72° to 79°F and 17% to 20% RH. Most of th values fall within the guidelines of 73° to 77°F temperature rang the 20 to 60 percent relative humidity range recommended by ASHR In general, the humidity stayed just below the 20% level for the and temperatures averaged about 76°F. The highest temperatures w found in the afternoon in the Assessor's office.

Carbon monoxide (CO) levels were measured throughout the buildin were found to be less than 1 ppm. The areas of primary concern on earlier monitoring were near the old HVAC unit and in the boi room. The heater was not operating much during the time of CO measurements.

C. Results of Questionnaires

Prior to the arrival of NIOSH, questionnaires had been circulate the requestor and had been summarized by the investigator. The of these questionnaires are summarized in Table 1. There was a response rate of 83% (108 of 130 occupants) to the questionnaire average of 55% complained it was too cold, 63% too hot, and 65% was stuffy. Headache was the #1 symptom reported with 73% repor headaches in the last year, 72% thought they were related to wor 56% saying they went away within 1 hour after work, and 64% repo they had had a headache in the last week. The next most commonl reported symptoms (within the last year) were burning or irritat (65%), nasal congestion (52%), and sinus infection (42%). Forty reported they had had a physician diagnoses of

sinusitis. Sixty-nine % rated the air quality as poor and the m did not have a clear picture of any seasonal variation in the ai quality. Most of the respondents (73%) reported they had no all rated the workplace health and safety conditions as average, tho their jobs were somewhat stressful (56%), but were either very satisfied (49%) or somewhat satisfied (51%) with their job. The majority of workers reported they had no control of their enviro (80%).

## VII. CONCLUSIONS

In general, measurements of ventilation system parameters (i.e., CO temperature, and relative humidity) did not reveal any particular p with the system on the day examined. However, conditions were such the outside air dampers were fully open and the VAVs and fan coil u were calling for cooling (thus suppling more air to the affected sp There was almost no return air available throughout the Annex. In cases, the only avenue for return air, since the return air fans or Carrier unit were not on, was out the doors, down the halls, and ou through the old Courthouse. Furthermore, many areas in the Annex h if any return air grills. Granted there was no reason for return a grills with no return fan, but this is an area that will need to be modified.

The areas of the Annex where symptoms were highest, e.g. the Assess and DA's office, are also areas with the largest number of people p square foot and little or no return air. Some of these areas may e the ASHRAE recommended maximum occupancy level for offices of 7 peo 1000 square feet.[28] Successful dilution ventilation is dependent on adequate supply and removal of air from occupied spaces. Usually t exhausted air should be just slightly greater than the supply. The not the conditions that apply in the Annex.

There appeared to be few problems in the old Courthouse area. The combination of induction units and a 100% outside air HVAC system a to be effective. There were some cases where good air distribution certain spaces may have been a problem, e.g., in the library, due t design changes. No obvious source of environmental or chemical contamination could be found in either the old Courthouse or in the The sampling conducted by the various consultants support this conc

Smoking is not allowed in the building, yet there are several areas environmental tobacco smoke (ETS) from outside or adjacent public a can get into non-smoking areas. ETS is a known carcinogen and is a irritant and allergen. Exposure to ETS should be reduced to the lo amount feasible.

## VIII. RECOMMENDATIONS

1) The preventive maintenance schedule for the HVAC systems appears quite good and should be continued.

2) In general, the ventilation in the Annex building needs to be corrected. The ventilation system should be adjusted to meet th current ASHRAE standard for outside air, i.e., 20 cubic feet per (CFM) of outside air per person.[28] The major problem appears to lack of proper return air throughout the building. This is furt exacerbated by the use of an economizer cycle on the outside air dampers and the use of VAVs to supply air to occupied spaces. T will be many times when the outside air dampers are closed, thus reducing the amount of outside air distribution throughout the building. Plus, if there is no demand for cooling through the V the supply of outside air is also shut down or severely reduced. number of actions can be taken to improve the ventilation (these listed below) but an overall evaluation of the ventilation syste the Annex is recommended.

   a). Reconnect the return air fans on the Carrier unit. This w provide at least a source of return air for the Annex.

   b). Add return air grills to areas where there are none. In s areas, the return air grill was located directly adjacent to t supply vent in the ceiling. More distance should be provided between these grills.

   c). The outside air damper on the Carrier unit should be set t insure a minimum of 10-20% outside air at all times. The HVAC will have to be checked to make sure it can handle the increas thermal loads during the summer and winter.

   d). The minimum openings on the VAVs should be set so that the CFM per person requirement of ASHRAE 62-1989 is satisfied at a times.

   e). Continue running the ventilation system after occupants le and start it up earlier in the morning to insure that the buil is purged prior to occupancy.

3) The old HVAC unit suppling air to the foyer area should be repla planned.

4) There were some areas in the Assessor's office where water had d the carpet along the outside wall. The carpet should be thoroug cleaned or, preferably, replaced and make sure that the cause of water damage has been corrected.

5) The bathrooms, particularly in the Assessor's office, need to be exhausted. One idea that was suggested is to provide booster fa the exhaust on the lower floors since this area is at the end of long duct for the exhaust fan located on the ceiling.

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4. U.S. Department of Labor/OSHA - Region VIII.
5. NIOSH, Region VIII
6. Colorado State Health Department, Denver, Colorado

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

TABLE 1
Indoor Air Quality Questionnaire Summary
MESA COUNTY COURTHOUSE
Grand Junction, Colorado
HETA 92-152
April 2, 1992

| AREA | | Percentage of Respondents (N=108 | | | | |
|---|---|---|---|---|---|---|
| | | DA | ASSESSOR | COURTS | TREAS | ANNEX |
| #1- Complaints | | | | | | |
| Too cold | 50 | 61 | 33 | - | 65 | 38 |
| Too hot | 63 | 57 | 100 | 25 | 65 | 63 |
| Stuffy | 71 | 78 | 50 | 50 | 60 | 50 |
| Moldy | 4 | 9 | - | - | 7 | - |
| Other odors | 17 | 70 | - | - | 47 | 25 |
| Crowded | 8 | 61 | 17 | - | 53 | - |
| Vibration | 4 | 4 | - | - | 2 | 25 |
| No complaints | 8 | - | - | - | 5 | - |
| Dusty | 25 | 22 | 33 | - | 37 | 38 |
| Noisy | 17 | 17 | 17 | - | 21 | - |
| Too dry | 17 | 30 | 33 | - | 16 | 25 |
| Too humid | - | - | - | - | - | - |
| Drafty | 8 | 30 | 17 | - | 26 | 25 |
| Lightning | 13 | - | 50 | 25 | 30 | 25 |
| Other | - | 9 | - | 50 | - | - |
| #2- Which apply? | | | | | | |
| Contacts | 25 | 30 | 33 | - | 33 | 13 |
| VDTs | 38 | 61 | 83 | 75 | 72 | 75 |
| Photocopiers | 21 | 4 | - | 25 | 12 | 13 |
| Smoke | 8 | 26 | 17 | 25 | 9 | 25 |
| None | 42 | 9 | - | - | 16 | 25 |
| #3- Physician diagnoses | | | | | | |
| Allergic R | 17 | 13 | 17 | - | 7 | - |
| Asthma | - | 9 | 17 | - | 7 | - |
| Allergies | 33 | 26 | 33 | - | 16 | 25 |
| Conjunctivitis | 13 | - | 17 | - | 2 | - |
| Sinusitis | 42 | 39 | 50 | - | 35 | 25 |
| None | 38 | 22 | 50 | 75 | 44 | 63 |
| Emphysema | - | - | - | - | 2 | - |
| Laryngitis | - | 13 | - | - | 9 | 13 |
| Bronchitis | 13 | 22 | 17 | - | 23 | 25 |
| Pneumonia | 8 | 4 | 17 | - | 5 | 13 |
| Other chest | 13 | 4 | - | - | 2 | - |
| #4-Symptoms last year | | | | | | |
| Cough | 25 | 30 | 17 | - | 23 | 13 |
| Wheezing | 4 | 4 | 17 | - | 12 | - |
| >4 colds | 25 | 26 | 17 | - | 12 | - |
| Shortness br | 13 | 4 | 17 | - | 14 | 13 |
| Chest pain | - | 4 | - | - | 5 | 13 |
| Headache | 79 | 83 | 67 | 50 | 56 | 38 |

TABLE 1 (Cont.)
Indoor Air Quality Questionnaire Summary
MESA COUNTY COURTHOUSE
Grand Junction, Colorado
HETA 92-152
April 2, 1992

| AREA | | DA | Percentage of Respondents (N=108<br>ASSESSOR | | COURTS | TREAS | ANNEX |
|---|---|---|---|---|---|---|---|
| #4 (cont) | | | | | | | |
| Br or irr Eyes | 75 | 57 | 67 | - | 63 | 50 | |
| Hay fever | 33 | 17 | 33 | - | 19 | 13 | |
| OTHER | 8 | - | - | - | - | - | |
| Nasal cong | 54 | 48 | 50 | 25 | 53 | 13 | |
| Sinus inf | 38 | 43 | 67 | 25 | 44 | 25 | |
| Sore throat | 50 | 57 | 33 | - | 42 | 13 | |
| Hoarse voice | 25 | 43 | 33 | - | 23 | 25 | |
| Migranes | 33 | 13 | 17 | 25 | 26 | 25 | |
| Fevers | - | - | - | - | 5 | - | |
| Sneezing | 33 | 48 | 33 | 25 | 49 | - | |
| NONE | - | 13 | 17 | 25 | 14 | 25 | |
| #5- Medications | | | | | | | |
| Pain relief | 46 | 52 | 50 | 50 | 47 | 50 | |
| Decongestant | 21 | 13 | 33 | - | 12 | - | |
| Antihistamine | 17 | 17 | 33 | 25 | 5 | - | |
| Antidepressant | - | - | - | - | 5 | - | |
| NONE | 29 | 30 | 17 | 50 | 42 | 50 | |
| OTHER | 13 | 9 | - | - | 14 | - | |
| #6- Rate IAQ in building | | | | | | | |
| Good | 4 | - | 33 | 25 | 7 | 13 | |
| Average | 25 | 17 | 17 | 75 | 33 | 63 | |
| Poor | 67 | 83 | 50 | - | 58 | 25 | |
| #7- Seasonal variation? | | | | | | | |
| Yes | 17 | 39 | 33 | 25 | 19 | 13 | |
| No | 29 | 17 | 33 | 25 | 26 | 38 | |
| Don't know | 54 | 30 | 33 | 25 | 44 | - | |
| NA | - | - | - | 25 | 5 | 50 | |
| Winter | | | | | | | |
| Spring | | | | | | | |
| Summer | | | | | | | |
| Fall | | | | | | | |
| #8-Symptoms related to work | | | | | | | |
| Headache | 71 | 87 | 67 | 50 | 58 | 38 | |
| Nasal Cong | 33 | 26 | 33 | - | 26 | 13 | |
| Sinus Cong | 42 | 39 | 33 | - | 35 | 13 | |
| Sinus Infection | 25 | 22 | 17 | - | 26 | 13 | |
| Eye irritation | 67 | 48 | 50 | 25 | 56 | 38 | |
| Sore throat | 29 | 26 | 17 | - | 19 | 13 | |
| Hoarseness | 8 | 22 | 17 | - | 16 | 13 | |
| Runny nose | 33 | 26 | 33 | - | 16 | 13 | |

TABLE 1 (Cont.)
Indoor Air Quality Questionnaire Summary
MESA COUNTY COURTHOUSE
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|---|---|---|---|---|---|---|
| | | DA | ASSESSOR | COURTS | TREAS | ANNEX |
| #8-(cont.) | | | | | | |
| Memory loss | - | - | - | - | 5 | - |
| Dizziness | 4 | 4 | - | - | 7 | - |
| NONE | 4 | - | 33 | 25 | 16 | 50 |
| Fever | 4 | - | - | - | 2 | - |
| Sneezing | 29 | 61 | 33 | 25 | 44 | 13 |
| Fatique | 33 | 26 | 17 | - | 35 | 38 |
| Eyes red | 50 | 22 | 33 | - | 23 | 13 |
| Cough | 8 | 26 | 17 | - | 19 | 13 |
| Wheezing | - | 4 | 17 | - | 12 | - |
| Shortness br | 8 | 4 | 17 | - | 12 | - |
| Chest tight | 4 | - | 17 | - | 7 | - |
| Skin/rash | 8 | - | 17 | - | 7 | - |
| Hearing prob | - | 4 | | - | - | - |
| OTHER | - | 4 | - | - | - | - |
| #9- Go away after 1 hr? | | | | | | |
| Yes | 46 | 74 | 17 | 75 | 49 | 38 |
| No | 33 | 17 | 50 | - | 30 | - |
| NA | 4 | 4 | 17 | - | 16 | 50 |
| Next morning? | | | | | | |
| Yes | 21 | 39 | 50 | 25 | 28 | 13 |
| No | 17 | - | - | - | 9 | - |
| NA | 13 | 13 | - | - | 30 | 50 |
| On vacation? | | | | | | |
| Yes | 9 | 22 | 17 | 50 | 14 | 13 |
| No | - | - | - | - | 5 | - |
| NA | 3 | 17 | 17 | - | 33 | 50 |
| #10- Symptoms in last week | | | | | | |
| Headache | 50 | 83 | 67 | 25 | 58 | 25 |
| Nasal Cong | 25 | 22 | 33 | - | 21 | - |
| Sinus Cong | 21 | 30 | 33 | - | 21 | - |
| Sinus Infect | 13 | 17 | - | - | 5 | 13 |
| Eye irritation | 54 | 39 | 50 | - | 44 | - |
| Sore throat | 17 | 13 | 17 | - | 12 | 13 |
| Hoarseness | 4 | 13 | 17 | - | 7 | 13 |
| Runny nose | 29 | 30 | 17 | - | 19 | 13 |
| Memory loss | - | - | - | - | 2 | - |
| Dizziness | 4 | - | - | - | 5 | 63 |
| NONE | 21 | 9 | 33 | 25 | 19 | - |
| Fever | - | - | - | - | 2 | - |
| Sneezing | 21 | 26 | 33 | 25 | 26 | - |
| Fatique | 13 | 30 | 33 | - | 21 | 13 |
| Eyes red | 29 | 13 | 17 | - | 21 | 13 |
| Cough | - | 22 | 17 | - | 9 | - |
| Wheezing | - | 4 | 17 | - | 5 | - |
| Shortness br | 4 | - | 17 | - | 7 | - |

| | | | | | | |
|---|---|---|---|---|---|---|
| Chest tight | - | - | 17 | - | - | - |
| Skin/rash | - | - | - | - | 5 | - |
| Hearing prob | - | - | - | - | 5 | - |
| OTHER | - | 4 | - | - | - | - |

TABLE 1 (Cont.)
Indoor Air Quality Questionnaire Summary
MESA COUNTY COURTHOUSE
Grand Junction, Colorado
HETA 92-152
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| AREA | | DA | Percentage of Respondents (N=108<br>ASSESSOR | COURTS | TREAS | ANNEX |
|---|---|---|---|---|---|---|
| #11- | Allergies or other Probs? | | | | | |
| | Yes | 17 | 26 | 17 | 25 | 16 | 13 |
| | No | 67 | 74 | 50 | 50 | 77 | 63 |
| #12- | Work H & S rank? | | | | | |
| | Excellent | - | - | - | - | 2 | - |
| | Good | 21 | - | 33 | 25 | 19 | 75 |
| | Average | 29 | 61 | 33 | 75 | 30 | 25 |
| | Poor | | 33 | 43 | 33 | - | 40 |
| | - | | | | | | |
| | Bad | 13 | - | - | - | 5 | - |
| #13- | Job stress level | | | | | |
| | Very Stress | 38 | 35 | - | 25 | 37 | - |
| | Somewhat | 50 | 48 | 100 | 75 | 51 | 88 |
| | Not very | 8 | 22 | - | - | 14 | 13 |
| | Not at all | - | - | - | - | - | - |
| #14- | Job satisfaction | | | | | |
| | Very Satisfied | 38 | 48 | 33 | 50 | 63 | 88 |
| | Somewhat | 50 | 52 | 33 | 50 | 56 | 13 |
| | Dissatisfied | - | - | - | - | - | - |
| | Very Dissat | - | - | - | - | - | - |
| #15- | % time in bldg | | | | | |
| | 0-25% | | | | | |
| | 26-50% | | | | | |
| | 51-75% | 8 | 39 | - | - | 5 | - |
| | 76-100% | 88 | 61 | 100 | 100 | 95 | 100 |
| #16- | % time in office | | | | | |
| | 0-25% | - | - | 17 | - | 7 | - |
| | 26-50% | 4 | 4 | - | - | 2 | - |
| | 51-75% | 29 | 39 | 17 | - | 21 | 13 |
| | 76-100% | 63 | 57 | 50 | 100 | 70 | 88 |
| #17- | Items located near | | | | | |
| | Photo copier | 33 | 74 | 83 | 100 | 58 | 88 |
| | Laser printer | 29 | 9 | 17 | - | 28 | 13 |
| | Windows | 29 | 74 | 100 | 100 | 60 | 88 |
| | Plants | 42 | 61 | 100 | 100 | 74 | 100 |

TABLE 1 (Cont.)
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|---|---|---|---|---|---|---|
| | DA | | ASSESSOR | COURTS | TREAS | ANNEX |
| #18- Control of work enivron | | | | | | |
| Very good contr | - | - | - | 50 | 9 | - |
| Some | 8 | - | 50 | 50 | 42 | 38 |
| No control | 88 | 100 | 50 | - | 51 | 63 |
| #19- Which can be controlled? | | | | | | |
| Temperature | - | - | 33 | 25 | 33 | - |
| Air movement | 4 | 4 | 50 | 75 | 28 | 50 |
| Light | 4 | - | 17 | - | 19 | 13 |
| No control | 83 | 96 | 33 | - | 44 | 50 |
| #20- Rate lighting | | | | | | |
| Too bright | 13 | - | - | - | 21 | 25 |
| Little too | 21 | 17 | - | - | 35 | 13 |
| Just right | 46 | 61 | 50 | - | 35 | 50 |
| Little too dim | 8 | 17 | 17 | 100 | 5 | 25 |
| Too dim | - | - | 33 | - | - | - |