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Santa Fe Indian Hospital
Santa Fe, New Mexico

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PREFACE

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ACKNOWLEDGMENTS AND AVAILABILITY OF REPORT

This report was prepared by Robert Malkin and Charles McCammon, of the Hazard Evaluations and Technical Assistance Branch, Division of Surveillance, Hazard Evaluations and Field Studies (DSHEFS). Field assistance was provided by Rachel Bachman. Desktop publishing by Kathy Mitchell.

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Health Hazard Evaluation Report 96-0207-2635
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SUMMARY

On June 26, 1996, the National Institute for Occupational Safety and Health (NIOSH) received a request for a Health Hazard Evaluation (HHE) from management at the Santa Fe Indian Hospital located in Santa Fe, New Mexico. An indoor environmental quality study was requested regarding symptoms reported by employees, predominantly nurses. Symptoms included headache, nasal congestion, cough, sneezing, irritated eyes, and fatigue.

A site visit was conducted on December 3-5, 1996. The investigation included: a walkthrough tour of the hospital; examination of heating, ventilating, and air conditioning (HVAC) systems; an environmental survey which included measurements for carbon dioxide (CO_2) temperature, and relative humidity (RH) throughout the facility; and a medical evaluation which consisted of a questionnaire survey and interviews with hospital employees.

The walkthrough tour revealed that many modifications had been made to the interior of the hospital but the ventilation system had not been updated to reflect those changes. These modifications resulted in areas with inadequate air distribution (without supply or return vents). Measurements of CO_2, however, ranged from 300-575 parts per million (ppm) and were within ASHRAE guidelines of a maximum level of 800 ppm. Temperatures ranged from 70.3°F to 81°F and were above the maximal levels recommended by ASHRAE.

Approximately 225 employees worked in the hospital. Using a roster of employees present at work during the days of the site visit, interviews were conducted with 107 employees and questionnaires were distributed to 128 persons and returned by 103 employees (80%). From questionnaire responses, the most common symptoms (and their prevalence rates) occurring once a week or more and improving when the employee left work were dry, itching, or irritated eyes (32%), tired or strained eyes (28%), and dry throat (18%). Forty-four (43%) respondents reported having one or more symptoms that had occurred at work one or more days a week during the preceding 4 weeks and improved when away from work. However, symptoms prevalence rates were lower than what NIOSH investigators have found in previous studies of office buildings.

The NIOSH investigators found no exposures or environmental conditions that would help explain the symptoms reported by employees. However, several ventilation deficiencies were noted during the survey. Recommendations to improve the indoor environmental quality of the building included: (1) evaluating the HVAC system and making all necessary improvements; (2) equipping the exhaust on the X-ray processor with a powered exhaust; (3) enclosing the positive pressure side of the ETO exhaust fan in a vented exhaust; (4) repairing the exhaust ventilation serving the physician's on-call room and men's locker room; and (5) establishing an indoor environmental quality committee to address employee concerns.

Keywords: SIC 8062 (general medical hospital) indoor air quality, indoor environmental quality, ventilation

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INTRODUCTION

On June 26, 1996, the National Institute for Occupational Safety and Health (NIOSH) received a request from the Santa Fe Service Unit Director of the Indian Health Service for a health hazard evaluation (HHE) at the Santa Fe Indian Hospital, Santa Fe, New Mexico. Employees, particularly nurses, at the hospital were experiencing recurring illnesses they felt were associated with working in the building. Symptoms included headache, nasal congestion, cough, sneezing, irritated eyes, and fatigue.

BACKGROUND

The Santa Fe Indian Hospital is an 82,000-square foot facility that employs 230 staff and provides comprehensive health care delivery to 20,000 native Americans in the surrounding area. The facility includes a 39-bed inpatient unit, outpatient, urgent care, obstetrical and dental departments, operating suites, central sterile supply, cafeteria, general services, medical records, billing and administrative departments. Ventilation in the building is provided by seven constant volume heating, ventilating, and air-conditioning (HVAC) systems. Each system supplies a zone within the hospital where the air is further conditioned using localized fan coil units. Cooling is provided by chilled water to the heat pump units from an outside cooling tower. During the cold weather months the cooling system is turned off (cooling towers) and if cooling is needed, additional outside air is used. Heat is provided by hot water to the heat exchanger from a central boiler. A solar-powered system is also used to heat a glycol solution which is then passed through the heat exchanger in the HVAC system.

The entire main hospital was evaluated which included: general medical services (GMS); extended clinic; obstetrics (OB) unit; operating room suite (OR); cafeteria; general services; central supply; administrative offices; nurse and doctor's offices; medical records; ambulatory care; physical therapy; laboratory; and X-ray areas.

METHODS

Environmental Evaluation

During the environmental evaluation, information was collected on the building, the evaluation area, and the HVAC systems. Descriptive information for the building (age, size, construction, location, etc.), the area to be evaluated (size, type of office space, cleaning policies, furnishings, pollutant sources, etc.), and the HVAC systems (type, specifications, maintenance schedules, etc.) was included. A walkthrough tour of the facility was taken and inspections of the evaluated area and HVAC systems were conducted to determine current conditions. The purpose of the environmental investigation was to obtain information required to determine the condition of building systems and document the current indoor environmental conditions.

In addition to collecting the information described above, indicators of occupant comfort were measured. These indicators were carbon dioxide (CO_2, an indicator of outside air exchange), temperature (T), and relative humidity (RH). Real-time CO_2 concentrations were measured using a Gastech Model RI-411A, Portable CO_2 Indicator. This portable, battery-operated instrument uses a non-dispersive infrared absorption detector to measure CO_2 in the range of 0-4975 ppm, with a sensitivity of ±25 ppm. Instrument zeroing and calibration were performed prior to use by setting the outside air reading of CO_2 to 300 ppm.

Real-time temperature and humidity measurements were made using a TSI Inc. VelociCalc Plus, Model 8360, battery-operated air velocity meter. This meter is capable of providing direct readings for dry-bulb temperature and RH, ranging from 14 to 140°F +/-

0.5°F and 20 to 100% +/- 4%, respectively.

Medical Evaluation

The medical evaluation consisted of a walkthrough tour, interviews with employees, and a questionnaire survey. Approximately 215 employees worked in the main hospital building and 25 worked in adjacent structures. Using a roster of employees as a guide, each employee present at work on December 4-5, 1996, was given a questionnaire at his or her work area and asked to complete it either during the day or no later than the next day. Some questionnaires were left with supervisors to give to employees who were working the night shift (11 p.m.-7 a.m.). These questionnaires were returned by mail to NIOSH. NIOSH investigators were available in the work area to answer any questions and assist the employees. A total of 128 questionnaires were distributed and 103 were returned for a response rate of 80%. Thus, the surveyed group represented 43% of the workforce.

The interview questions asked employees about environmental problems at the hospital, job duties, and the presence of symptoms that employees attributed to working at the hospital. Personal interviews were conducted at the same time as the questionnaire was distributed. A total of 107 employees were interviewed; some employees consented to the interview but did not fill out the questionnaire.

For determination of prevalence rates from questionnaire data, responses of "1-3 days per week in the last 4 weeks" and "every or almost every workday" were considered "yes" responses and "1-3 days in the last 4 weeks" and "not in the last 4 weeks" were considered to be "no" responses. Symptoms that occurred once a week or more for the last 4 weeks and improved after the employee left the hospital were considered "work-related." A lack of response to a symptom question was considered a "no" response. Although participants were instructed to answer all questions, NIOSH investigators have observed that participants are likely to respond only to those symptoms that they have been experiencing.

Overall symptom data from employees throughout the hospital and prevalence rates were determined. Since the original reports of symptoms were from nurses and, in particular GMS nurses, we also examined whether prevalence rates differed between nurses or GMS nurses and other employees. Prevalence rates of GMS nurses were also compared to other nurses.

Data were analyzed using SAS 6.11.[1] Differences in symptoms prevalence between occupational groups were assessed with chi-square analyses or Fisher's exact tests.

EVALUATION CRITERIA

Indoor environmental quality (IEQ) is affected by the interaction of a complex set of factors which are constantly changing. Four elements involved in the development of IEQ problems are:

- sources of odors or contaminants
- problems with the design or operation of the HVAC system
- pathways between contaminant sources and the location of complaints
- activities of building occupants

A basic understanding of these factors is critical to preventing, investigating, and resolving IEQ problems.

The symptoms and health complaints reported to NIOSH by non-industrial building occupants have 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, varying degrees of itching or burning eyes, irritations of the skin, nasal congestion, dry or irritated throats, and other respiratory irritations. Usually, the

workplace environment has been implicated because workers report that their symptoms lessen or resolve when they leave the building.

A number of published studies have reported high prevalences of symptoms among occupants of office buildings. Scientists investigating indoor environmental problems believe that there are multiple factors contributing to building-related occupant complaints.[2,3] Among these factors are imprecisely defined characteristics of heating, ventilating, and air-conditioning (HVAC) systems, cumulative effects of exposure to low concentrations of multiple chemical pollutants, odors, elevated concentrations of particulate matter, microbiological contamination, and physical factors such as thermal comfort, lighting, and noise.[4,5,6,7,8,9]

There are also reports describing results which show that occupant perceptions of the indoor environment are more closely related than any measured indoor contaminant or condition to the occurrence of symptoms.[10,11,12] Some studies have shown relationships between psychological, social, and organizational factors in the workplace and the occurrence of symptoms and comfort complaints.[13,14,15]

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, carbon monoxide poisoning, and reaction to boiler corrosion inhibitors. The first three conditions can be caused by various microorganisms or other organic material. Legionnaires' disease and Pontiac fever are caused by Legionella bacteria. Sources of carbon monoxide include vehicle exhaust and inadequately ventilated kerosene heaters or other fuel-burning appliances. Exposure to boiler additives can occur if boiler steam is used for humidification or is released by accident.

Problems NIOSH investigators have found in the non-industrial indoor environment have included: poor air quality due to ventilation system deficiencies, overcrowding, volatile organic chemicals from furnishings or machines, structural components of the building and contents, tobacco smoke, microbiological contamination, and outside air pollutants; comfort problems due to improper temperature and RH conditions, poor lighting, and unacceptable noise levels, adverse ergonomic conditions, and job-related psychosocial stressors. In most cases, however, these problems could not be directly linked to the reported health effects.

Standards specifically for the non-industrial indoor environment do not exist. NIOSH, the Occupational Safety and Health Administration (OSHA), and the American Conference of Governmental Industrial Hygienists (ACGIH) have published regulatory standards or recommended limits for occupational exposures.[16,17,18]

With few exceptions, pollutant concentrations observed in non-industrial indoor environments fall well below these published occupational standards or recommended exposure limits. The American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) has published recommended building ventilation design criteria and thermal comfort guidelines.[19,20] The ACGIH has also developed a manual of guidelines for approaching investigations of building-related complaints that might be caused by airborne living organisms or their effluents.[21]

Measurement of indoor environmental contaminants has rarely been helpful in determining the cause of symptoms and complaints except where there are strong or unusual sources, or a proven relationship between contaminants and specific building-related illnesses. The low-level concentrations of particles and mixtures of organic materials usually found are difficult to interpret and usually impossible to causally link to observed and reported health symptoms. However, measuring ventilation and comfort indicators such as CO_2, temperature, and RH has proven useful in the early stages of an investigation in providing information relative to the

proper functioning and control of HVAC systems. The basis for measurements made during this evaluation follow:

Carbon Dioxide

Carbon dioxide is a normal constituent of exhaled breath and, if monitored, may be useful as a screening technique to evaluate whether adequate quantities of fresh air are being introduced into an occupied space. The ASHRAE Standard 62-1989, Ventilation for Acceptable Indoor Air Quality, recommends outdoor air supply rates of 20 cubic feet per minute per person (cfm/person) for office spaces and conference rooms, and 15 cfm/person for reception areas, and provides estimated maximum occupancy figures for each area.[19]

Indoor CO_2 concentrations are normally higher than the generally constant ambient CO_2 concentration (range 300-350 ppm). When indoor CO_2 concentrations exceed 800 ppm in areas where the only known source is exhaled breath, inadequate ventilation is suspected. [19] Elevated CO_2 concentrations suggest that other indoor contaminants may also be increased.

Temperature and Relative Humidity

The perception of comfort is related to one's metabolic heat production, the transfer of heat to the environment, physiological adjustments, and body temperatures. Heat transfer from the body to 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% or more of the occupants would be expected to find the environment thermally comfortable.[22]

RESULTS

Environmental Results and Observations

The office areas were evaluated and the HVAC system components were generally clean and in good condition. The outside air intake for each of the HVAC systems had a small area which was always open. During the winter months, if cooling was needed, the main louvers to the outside would open to admit the cooler outside air. The fan coil units were located in the ceiling and had difficult and limited access, making servicing difficult.

Many of the spaces in the hospital, particularly office areas, had been changed numerous times since the building was constructed but the ventilation system had never been modified to account for these changes. Consequently, many areas have problems with inadequate air distribution. For example, there is a room in the offices for the pharmacy staff with no supply or return grills. Another office in this area has been placed in a corner where little air supply is distributed due to partitions. In a different location, an office has a supply duct but no return, and the doors are usually kept closed. The medical offices and medical records area were quite warm and reportedly were often that way. All these problems suggest the need for a comprehensive reassessment and balancing of the HVAC system.

Other areas in the hospital were checked for specific chemical handling and local exhaust ventilation. The X-ray developing unit had passive exhaust hoses leading up through the ceiling. These units should have a powered exhaust. On the ETO sterilizer, the positive pressure side of the exhaust fan was not enclosed in an exhaust hood. There is an exhaust manifold nearby which should be expanded to include the exhaust fan.

Environmental measurements taken throughout the hospital in the morning and afternoon are presented

in Table 1. None of the CO_2 levels exceeded the ASHRAE[19] guideline limit of 800 ppm that is considered to indicate inadequate amounts of outside air ventilation. Carbon dioxide concentrations ranged from 300 to 575 ppm in the monitored areas during both the morning and afternoon measurement periods, and 300 ppm outside, throughout the day. The highest level measured was in Building 7 which is adjacent to the hospital. Since there are no OSHA standards at this time for indoor air quality, NIOSH investigators use the ASHRAE guideline for CO_2.

Temperatures ranged from 70.3°F to 81°F during the morning period (Table 1) and from 70.3°F to 76.1°F in the afternoon. Outdoor temperatures ranged from about 25°F in the morning to 50.5°F in the afternoon. The temperatures ranged above those recommended by ASHRAE. Relative humidity was quite constant and low both indoors and outside, staying at 14% indoors throughout the day and 12% outdoors.

The exhaust ventilation system for part of the hospital was not operating at the time of the site visit. The lack of ventilation was particularly problematic for areas where there were showers, such as the men's locker room and physician's on-call room. There was also a strong moldy odor in those areas. Hospital environmental personnel were unaware of this problem and stated that they would determine why the exhaust ventilation was not functioning and repair it as soon as possible.

The ventilation system in patients' rooms was manually controlled by a rheostat labeled "air conditioning," and this switch controlled all ventilation (cooling and heating) to the rooms. Many of these switches were on the off position at the time of the site visit, since it was late fall and many employees, thinking that cooling was not required, did not turn the switch on. This finding was also true for the physician's on-call room.

Medical Results

Questionnaires were received from 103 of 128 (80%) hospital employees, working on the days of the site visit. Of the 101 employees answering the question relating to gender, 27 were male (27%), and 74 were female (73%). Twelve (12%) currently smoked cigarettes, 16 (16%) were former smokers, and 70 (70%) had never smoked. The mean age of the respondents was 44 years (range 21-66), and they had worked at the same location in the building for an average of 7 years (range 1-25). Fifteen employees (15% of all questionnaire respondents) reported that a physician told them they had asthma; 10 of the 15 (67%) responded that the asthma had gotten worse since they had worked at the hospital and 9 of the 15 (60%) said they were diagnosed with asthma while working at the hospital. Ninety-nine respondents answered the question that asked about occupation. They included: 41 nurses , 18 support personnel , 10 clerk/secretaries , 6 physicians , 4 lab technicians , and 20 classified as "other" consisting of pharmacists, dental, and optometry personnel. Eighty of the 96 participants (83%) who answered the question reported they predominantly worked the day shift.

The questionnaire results regarding symptoms are shown in Table 2 at the end of this report. The first column of results in the table shows the percentage of employees who reported experiencing the respective symptom once a week or more often while at work during the four weeks preceding the survey. The most prevalent symptoms (and their prevalence rates) were dry, itching or irritated eyes (32%), tired or strained eyes (28%), or dry throat (18%).

The second column of results shows the percentage of employees who reported experiencing the respective symptom once a week or more often while at work during the 4 weeks preceding the survey and also reported that the symptom tended to get better when they were away from work. This latter criterion has, in some studies of indoor air quality, been used to define a "work-related" symptom, but it is possible that a symptom which does not usually improve when away from the building could also be due to conditions at work. The reported "work-related" frequent symptom prevalences, showing the

second column, are lower than the corresponding symptom prevalences over the last 4 weeks (shown in the first column), and are highest for dry, itching or irritated eyes (22%), tired or strained eyes (15%), and stuffy nose or sinus nasal congestion (13%).

As a group, nurses were generally no more likely to report individual symptoms than other employees. Nurses in the GMS unit, however, were statistically significantly more likely to report "work-related" stuffy nose than other nurses; five of the 15 GMS nurses reported a "work-related" stuffy nose and no nurse working elsewhere reported that symptom. (Fisher's exact p=0.008). Three nurses in the GMS unit (and no nurses working elsewhere) reported the symptom "work-related" fatigue, but this difference was not statistically significant (Fisher's exact p=0.06). Overall, 44 (43%) respondents reported having one or more "work-related" symptoms and 19 (18%) reported three or more "work-related" symptoms. Nurses were no more likely to report more than three "work-related" symptoms than other employees; 20% of nurses reported three or more "work-related" symptoms and 18% of non-nurse employees reported 3 or more "work-related" symptoms (p=0.82). Five of 15 GMS nurses (33%) reported three or more "work-related" symptoms while 3 of 21 other nurses (14%) reported three or more "work-related" symptoms; this difference was not statistically significant (Fisher's exact p=0.24).

The most prevalent perceived environmental deficiencies reported by employees were that the hospital was frequently too hot (47%), too dry (46%), had too little air (43%), and had odors (30%). Eleven of the 15 GMS nurses answering the question reported that they were frequently too hot at work (73%) while only 8 of the 21 other nurses (38%) reported being too hot (p=0.04). A similar relationship was found when comparing GMS nurses to all other hospital employees. Seventy-three percent of all GMS nurses were likely to report being hot frequently as compared to 42% of other employees (p=0.03), and 73% frequently experienced too little air at work as compared to 39% of other employees (p=0.02). Employees who reported that they were too hot were more likely to report the symptoms "work-related" irritated eyes ($p<0.01$) and "work-related" strained eyes ($p<0.01$). A similar relationship was seen for employees who reported too little air and "work-related" strained eyes (p=0.02) and "work-related" irritated eyes ($p<0.01$).

The symptoms revealed in the interviews were similar to those reported on the questionnaire and included: nasal congestion and sinus problem (21 employees - 20%), headache (14 employees - 13%), cough (9 employees - 8%), and new onset asthma (10 employees - 9%). Four of the 6 interviewed physicians reported odors in the on-call room and that they experienced aggravation of symptoms, particularly nasal or sinus congestion and headache, when they were required to sleep in the room. One physician reported that his symptoms improved if he opened the window to the on-call room while he was there.

DISCUSSION AND CONCLUSIONS

Symptom prevalences at the hospital were lower than those usually encountered by NIOSH investigators in studies of office buildings (Table 3).[23, 24, 25, 26] However, environmental deficiencies evident on the walkthrough tour may have resulted in some symptoms in some people. Although we did not measure levels of microorganisms (fungi and bacteria) in the hospital, the lack of functioning ventilation, presence of water from the showers, and odors in the men's locker room and physician's on-call room may indicate the presence of fungi in those areas. Allergic diseases occasionally associated with fungal exposures in indoor environments include allergic rhinitis (nasal allergy), allergic asthma, allergic bronchopulmonary aspergillosis (ABA), and extrinsic allergic alveolitis (hypersensitivity pneumonitis).[27] Allergic respiratory diseases resulting from exposures to microbial agents have

been documented in agricultural, biotechnology, office, and home environments.[28,29,30,31,32,33,34,35] At the Santa Fe Indian Hospital, the lack of ventilation and resultant odors might have been a potential problem for users of the physicians' on-call room or men's locker room. Four of the interviewed physicians did report symptoms (particularly nasal or sinus congestion and headache) that they associated with spending the night at the hospital. Spending the night at the hospital would mean that the physician would use the on-call room for longer periods of time.

The lack of ventilation in patients' rooms (because the air conditioning was set to the "off" position) may have led to problems with temperature control in the adjacent nursing areas as well as a build-up of certain odors and chemicals associated with patient care, resulting in irritative symptoms in some employees. This lack of sufficient ventilation in patient rooms is consistent with the reports among GMS nurses of being frequently "too hot" and frequently experiencing "too little air."

Asthma was reported by 15% of the participants, while it is estimated that the prevalence in the general population is approximately 5%.[36] A study of asthma prevalence in children of the Jemez Pueblo, also located in New Mexico, found that 12.3% of children up to age 13 had been diagnosed with asthma.[37] An occupational cause for the increased asthma prevalence rate found in workers at the Santa Fe Indian Hospital was not apparent. The increased asthma prevalence rate among workers may be a reflection of the increased asthma prevalence of the population surrounding the hospital.

Recommendations made in the following section will be useful in improving environmental quality at the hospital. However, for the majority of employees, NIOSH investigators were unable to definitively determine the cause of the reported symptoms. Limitations of this study include: 1) although the response rate of the questionnaire was 80%, approximately only 43% of the employees were surveyed and perhaps those that were not available were the most affected and 2) all symptoms were self-reported, many were subjective, and no quantification of the severity of any symptom was performed.

RECOMMENDATIONS

Based on the results and observations of this evaluation, the following recommendations are offered to correct those problems identified.

1. The entire HVAC system needs to be evaluated and appropriate changes made. Some additional ducting and new supply and return grills will be needed. This work should be conducted by a qualified ventilation engineer. The ASHRAE guidelines should be followed in the redesign/corrections in the HVAC.[23,24] The system should be balanced after modifications.

2. Equip the the X-ray processor with a powered exhaust.

3. Enclose the positive pressure side of the ETO exhaust fan in a vented exhaust.

4. Repair the exhaust ventilation serving the physicians' on-call room and men's locker room. Inspect and, if necessary, clean the ducts serving those areas.

5. Instruct nurses on proper operation of the ventilation system in patients' rooms.

6. Trucks should not idle at the loading docks. The re-entrainment of diesel exhaust was possible if trucks were left idling at the dock. Although it was the hospital policy to ask truck drivers to turn off their trucks, this apparently was not being done, particularly when dietary supplies were being delivered.

7. An indoor environmental quality committee should be established to assist in effective communication between management of the hospital and employees. Employees should have a means of voicing concerns over indoor environmental quality issues and be made aware of problems with the hospital and decisions that facility management make to address those problems.

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Table 1
Summary of Carbon Dioxide, Temperature, and Humidity Readings
Santa Fe Indian Hospital, Indian Health Service
HETA 96-0207
December 5, 1996

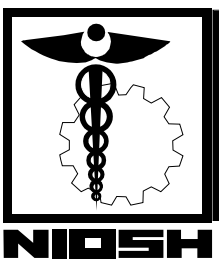
Location	Morning			Afternoon		
	Time	CO_2 (ppm)	Temp,°F (%RH)	Time	CO_2 (ppm)	Temp,°F (%RH)
Outside	0900	300	-	1400	300	50.5 (12%)
Building 7	0915	850	-	1408	575	70.3
SE corner, Hospital	0920	425	70.3	1412	425	74
SW corner, Hospital	0927	450	71.9	1416	400	75.3
NW corner, Hospital	0930	425	72.7	1420	400	74.9
NE corner, Hospital	0932	500	74	1423	475	74.8
Admin. Office	0933	425	74.8 (14%)	1425	425	-
Medical offices	0940	500	77	1426	525	75.6
Medical Records	0941	475	81	1430	525	75.6
Outpatient waiting room	0942	475	78.1	1431	550	75
Outpatient Treatment	0942	475	76.2	1431	450	74.6
Pharmacy offices	0945	525	76.1	1433	425	75
Pharmacy	0945	425	75.6	1432	475	74.9
X-ray	0950	425	74.6	1434	450	74.7
X-ray record room	0951	450	-	1436	450	74.7
Lab	0952	425	74.4	1435	425	76.1
Microbiology (Lab)	0955	425	-	1435	425	76.1
Central Supply, clean	1000	400	72.2	1443	425	74.3
OR entrance	1005	425	74.3	1440	425	74.9
Inpatient Pharmacy	1007	475	75	1445	450	76
Library	1010	450	74	1448	475	74.7
Bathroom (near Library)	1012	550	-	1449	500	-
Room 156	1015	475	73.2 (14%)	-	-	-
GMS	1035	575	74.8	1447	475	75.9

Table 2
Symptoms Experienced At Work among 103 Surveyed Employees
Santa Fe Indian Hospital, Indian Health Service
HETA 96-0207
(percent)

Symptom	Frequently Experienced Last Four Weeks "While at Work"	Have Frequent "Work-Related" Symptoms
Dry, itching or irritated eyes	32	22
Tired or strained eyes	28	15
Dry throat	18	10
Sneezing	18	6
Headache	18	10
Unusual tiredness, fatigue, or drowsiness	17	10
Stuffy or runny nose, or sinus congestion	17	13
Cough	16	5
Difficulty remembering things or concentrating	14	7
Wheezing	10	5
Dry or itchy skin	9	1
Dizziness or lightheadedness	8	2
Sore throat	6	3
Shortness of Breath	4	3
Chest tightness	5	3

Table 3
Prevalence (percent) of "Work-Related" Symptoms in Other Studies
Santa Fe Indian Hospital, Indian Health Service
HETA 96-0207

Symptom	Present Study- Santa Fe Indian Hospital n=103	Building #1 Detroit, MI[23] n=184	Building #2 Harrisburg, PA[24] n=416	NIOSH study of 80 office buildings[25] n=2435	Washington State Office Buildings[26] (non-problem buildings) n=646
dry, itching or irritated eyes	22	27	36	30	30
tired or strained eyes	15	30	40	32	38
unusual tiredness, fatigue, or drowsiness	10	30	33	25	25
headache	10	23	28	25	24
sore or dry throat	10	28	21	16	
stuffy or runny nose, or sinus congestion	13	24	31	21	21
cough	5	12	9	9	5
wheezing	5	4	2	4	2
concentration problems	7	7	8	9	11
dizziness or lightheadedness	2	9	8	8	7



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Safety and health at work for all people
Through research and prevention