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HAROLD WASHINGTON SOCIAL SECURITY CENTER
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I. SUMMARY

On August 6-7, 1991, industrial hygienists from the National Institute for Occupational Safety and Health (NIOSH) conducted a health hazard evaluation (HHE) at the Harold Washington Social Security Center in Chicago, Illinois in response to a confidential request to evaluate indoor environmental quality concerns, exposures to vapors from wallpaper and wallpaper adhesive, and chemical contamination of the drinking water.

Questionnaires were distributed to approximately 250 workers and eight individuals were interviewed to obtain information regarding employees' symptoms and perceptions of the building environment. Temperature, relative humidity, and carbon dioxide (CO_2) measurements were made at various locations three times during the day. Area air samples for petroleum distillates and carbon monoxide (CO) were collected. Several of the heating, ventilating, and air-conditioning (HVAC) units were opened and visually examined. Drinking water samples were analyzed for volatile organic compounds (VOCs). Samples of vinyl wall coverings were submitted for head space/off-gas analyses.

One-hundred thirty-four questionnaires were returned out of the approximately 250 distributed. The predominant environmental complaints reported by employees concerned a lack of air circulation, humidity level, and temperature fluctuations. The most frequently reported symptoms were headache, stuffy nose, and runny nose. All of the indoor CO_2 concentrations were lower than 1000 parts per million (ppm), a guideline suggested by the American Society of Heating, Refrigerating, and Air-conditioning Engineers (ASHRAE). The majority of the temperature and relative humidity pairings were outside the acceptable ranges of operative temperature and humidity suggested by ASHRAE. The samples of vinyl wall covering contained trace concentrations of butyl cellosolve and various alkyl benzenes (such as trimethyl benzene). Trihalomethanes were detected in the water samples but were within acceptable Safe Drinking Water Act guidelines for drinking water. Concentrations of CO (non-detected to 7 ppm) and petroleum distillates (trace) were within acceptable environmental guidelines. During the walk-through survey, it was noted that rooms had been added and partial partitions were also in place. The fan for the basement and part of the first floor did not appear to provide sufficient air volume. The fan systems appeared to be well maintained.

No health hazards were identified; however, the environmental measurements indicated that there was a thermal comfort problem. The walk-through survey identified areas that had been originally designed as open office space which had been converted into rooms and other areas where partial partitions had been added that might interfere with air flow patterns. Recommendations included decreasing relative humidities and temperatures to within suggested guidelines.

KEYWORDS: SIC 9441 (administration of social, human resource, and income maintenance programs), indoor environmental quality, carbon dioxide, temperature, relative humidity, wallpaper, water quality.

II. INTRODUCTION

On August 6-7, 1991, industrial hygienists from the National Institute for Occupational Safety and Health (NIOSH) conducted a health hazard evaluation (HHE) at the Harold Washington Social Security Center in Chicago, Illinois. This site visit was made in response to a confidential request to evaluate indoor environmental quality concerns, exposures to vapors from wallpaper and wallpaper adhesive, and chemical contamination of the drinking water.

III. BACKGROUND

The Harold Washington Social Security Center was built in 1976 and uses a constant volume ventilation system. The building has ten stories and a full basement and employs approximately 1800 people. The ventilation system is powered off at 4:30 p.m., and all personnel except security guards are required to leave the building by 6:00 p.m. Smoking is not allowed in the office areas but was permitted in a section of the cafeteria.

The twenty-seven ventilation systems for the building are located on the second floor. The amount of intake air is determined by the outside air temperature. When outside temperatures exceed 45°F, the systems operate at 100% intake air; when temperatures are below 45°F, the system operate at 67% intake air. Intake air passes through coarse prefilters (two-inch polypads, 80% efficiency, eight pockets) which are changed every two weeks, and then through high efficiency bag filters which are changed according to gauge readings. Following filtration, intake air passes through a pre-heat/cooling coil chamber. In winter, humidity is added by a boiler steam line that passes through the pre-heat/cooling coil chamber and is then distributed to the work area. The ventilation systems are set up to service the floors in central quadrants, with the outside perimeters of the floors on separate systems. The cafeteria is on a separate ventilation system that supplies 100% intake and 100% exhaust at all times. The ventilation system was balanced according to specification in 1989. A contractor supplies onsite engineering staff 24 hours per day to oversee the ventilation system.

A portion of the first floor of the building uses heat from the ceiling lighting fixtures to heat the building. A three boiler steam heat system also supplies heat for the first floor. Evaporative coolers located on the roof are used for air-conditioning. Microwave ovens were located in several locations throughout the offices.

Four surveys have been completed at this facility to evaluate indoor environmental quality issues. The Alexsis Division of Alexander & Alexander Inc. conducted a study in August 1984 evaluating indoor environmental quality conditions on the second, fourth, eighth and tenth floors. Monitoring was done for ammonia, carbon monoxide (CO), carbon dioxide (CO_2), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), ozone, formaldehyde, hydrocarbon vapors, total dust, respirable dust, temperature, and relative humidity. The fourth and tenth floors had significant increases in CO_2 throughout the day (the fourth floor: 910 to 1350 ppm and the tenth floor: 790-1050 ppm), indicating possible inadequacies in air circulation. Smoking was identified as a potential problem on all floors. None of the other substances exceeded accepted environmental standards established by NIOSH, the Occupational Safety and Health Administration (OSHA), the American Conference of Governmental Industrial Hygienists (ACGIH), and ASHRAE.

Two surveys were conducted by Aires Environmental Services Limited. The second survey in September 1990, was an evaluation of the lower level area. Monitoring was done for total and respirable dust, CO, CO_2, nitrogen oxides (NO_x), SO_2, hydrogen cyanide (HCN), hydrogen sulfide, ozone, total aldehydes, total hydrocarbon vapors, temperature, and relative humidity. The temperature and relative humidity conditions were within the ASHRAE comfort ranges at that time. There had been a problem in the basement area with drain traps under the cafeteria that leaked onto the suspended fiberglass ceiling tiles of the lower level. Total respirable particles ranged from <5.8 to 6.2 micrograms per cubic meter ($\mu g/m^3$). Ozone concentrations ranged from nondetectable (ND) to 0.0017 parts per million (ppm). CO concentrations ranged from ND to 2 ppm. CO_2 concentrations ranged from 400 to 900 ppm. The rest of the compounds were nondetectable.

The third survey conducted in November 1990 looked at conditions on the eighth floor. The same compounds and conditions were evaluated as in the September 1990 survey. All the contaminant concentrations were within acceptable guidelines with the exception of CO_2 levels. The CO_2 concentrations ranged from 900 ppm to 1250 ppm during the day, indicating that there might not have been sufficient ventilation. Some ceiling tiles were observed to be water stained.

A fourth survey was conducted on March 14-15, 1991, by the United States Public Health Service, Division of Federal Occupational Health (USPHS/DFOH), Region V. This survey evaluated environmental conditions in the training area of the lower level. At the time of the site visit, CO and CO_2 levels were within acceptable limits. Nuisance particulate matter, fibers, and microbiological contaminants were also within acceptable ranges. The temperature and relative humidity conditions were slightly outside the acceptable ranges established by ASHRAE. It was determined that the ventilation system supplied a marginal amount of supply air for that area and there was poor circulation within the classrooms. The adequacies of the fans to supply sufficient air flow to those areas were questioned.

The facility uses water supplied by the City of Chicago, and there are three separate water systems. The facility uses three Filtrine charcoal purifiers (No. 10 TMX) for the drinking water systems which have continuously circulating pumps. These are the original systems installed in 1976 when the building was completed. The water is chilled to 40-44°F. The systems have branch lines to the water fountains on the floors. The water in these branch lines does not recirculate and stays in the lines until used, thus it has the potential to stagnant according to management representatives. The tank for the entire system is pumped out and allowed to refill every quarter year. Every week a portion of water in the tank is drained and replaced.

The wall papering operation had been completed before the site visit. According to the material safety data sheet (MSDS), the wallpaper adhesive manufactured by the Gibson-Homans Company contained sodium nitrate, 3-7% by weight.

IV. EVALUATION DESIGN

To obtain information of the staff's symptoms and perceptions of the building environment, approximately two hundred and fifty questionnaires were distributed and

one hundred and thirty-four returned with assistance from the American Federation of Government Employees union (Local 1395). Eight individuals who reported symptoms and requested an interview were interviewed during the investigation.

Real-time temperature and relative humidity measurements were made using a LCD Digital Hygrometer (Cole-Parmer Instrument Co.). Real-time carbon dioxide (CO_2) levels were measured using a Gastech Model RI-411A, portable CO_2 meter. A Draeger gas detection system and colorimetric detector tubes specific for petroleum distillates and CO were used to collect area air samples at the loading dock.

Temperature, relative humidity, and CO_2 measurements were made at various locations three times during the day of the site visit. The measurements were taken outside the main entrance, in the basement training area (three rooms), the loading dock, the check processing area - third floor, security area - third floor, two areas in the data processing area on the third floor, two areas in the data transcribers section on the third floor, and the southeast, southwest, northwest and northeast areas of the fourth and eighth floors. The purpose for the sequential readings was to observe any fluctuations in these parameters throughout the day. The first set of measurements was made between 6:45-8:15 a.m. at the beginning of the workshift, the second set between 11:00 a.m. and 12:00 noon, and the third set of measurements was made between 2:45-3:30 p.m. near the end of the workday.

With the assistance of maintenance and contract personnel, several of the HVAC units were opened and visually examined for microbial contamination, standing water, position of outside air intake dampers, general cleanliness, and particulate filter condition.

Six drinking water samples were collected at about 10:00 a.m. The samples were analyzed for 58 volatile organic compounds (VOCs) using purge and trap gas chromatography according to Environmental Protection Agency (EPA) Method 502.2. The water had a pH of approximately 6.5, which was lowered at the time of sample collection to a Ph of 2-3 using a 1:1 hydrochloric acid solution.

Samples of three different vinyl wall coverings were submitted for head space/off-gas analyses. The samples were heated to about 40ºC (no extreme temperatures) and the resulting effluents were collected on charcoal tubes for volatile organic compounds and ORBO-23 tubes for aliphatic aldehydes. The charcoal tubes were desorbed with carbon disulfide and analyzed by gas chromatography-mass spectrometry (GC-MS). The ORBO-23 tubes were desorbed with toluene and analyzed by GC-MS.

V. EVALUATION CRITERIA

A number of published studies have reported high prevalence of symptoms among occupants of office buildings.[1-5] NIOSH investigators have completed over 1100 investigations of the indoor environment in a wide variety of settings. The majority of these investigations have been conducted since 1979.

The symptoms and health complaints reported by 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. Typically, the workplace environment has been implicated because workers report that their symptoms lessen or resolve when they leave the building.

Scientists investigating indoor environmental problems believe that there are multiple factors contributing to building-related occupant complaints.[6,7] 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.[8-13] Reports are not conclusive as to whether increases of outdoor air above currently recommended amounts ($\geq$15 cubic feet per minute per person) are beneficial.[14,15] However, rates lower than these amounts appear to increase the rates of complaints and symptoms in some studies.[16,17] Design, maintenance, and operation of HVAC systems are 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.[18]

There are also reports describing results which show that occupant perceptions of the indoor environment are more closely related to the occurrence of symptoms than the measurement of any indoor contaminant or condition.[19-21] Some studies have shown relationships between psychological, social, and organizational factors in the workplace and the 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 potentially 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 and total hydrocarbons 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 found by NIOSH investigators in the non-industrial indoor environment have included poor air quality due to ventilation system deficiencies, overcrowding, volatile organic chemicals from office furnishings, machines, structural components of the building and contents, tobacco smoke, microbiological contamination, and outside air pollutants; 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 most cases, however, no cause of the reported health effects could be determined.

Standards have not been established specifically for non-industrial indoor environments. NIOSH, OSHA, and ACGIH have published regulatory standards or recommended limits for occupational exposures.[25-27] With few exceptions, pollutant concentrations observed in the office work environment 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.[28-29] 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.[30]

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

A. Carbon Dioxide

Carbon dioxide is a normal constituent of exhaled breath and, if monitored, can be used 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, 15 cfm/person for reception areas, and 60 CFM/person for smoking lounges, and provides estimated maximum occupancy figures for each area.[28]

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 1000 ppm in areas where the only known source is exhaled breath, inadequate ventilation is suspected. Elevated CO_2 concentrations suggest that other indoor contaminants 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, 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 will find the environment thermally comfortable.[29]

C. Microbial Contamination

Although microbiological contamination has not been found to be a common cause of health problems related to indoor air quality in NIOSH investigations, it can result in a potentially severe health problem known as hypersensitivity pneumonitis. This respiratory problem can be caused by bacteria, fungi, protozoa, and microbial products that may originate from ventilation system components.[30] A similar condition known as humidifier fever can also result from microbiological contamination of ventilation systems. In previous NIOSH investigations, microbiological contamination has resulted from water damage.

D. Drinking Water Standards

The Safe Drinking Water Act (SDWA), passed by Congress in 1986, specifies the current Maximum Contaminant Levels (MCLs) for organic compounds in community water systems which serve 10,000 or more people and use a disinfectant. The MCL for total trihalomethanes, which include bromodichloromethane, dibromochloromethane, tribromomethane (bromoform) and trichloromethane, is 0.10 milligrams/liter (mg/l), equivalent to 100 micrograms/liter (µg/l). The current MCL for trichloroethylene is 0.005 mg/l (5 µg/l).[31]

E. Wallpaper and Wallpaper Adhesive Components

Butyl cellosolve (ethyl glycol monobutyl ether) is a solvent which has been identified as an irritant of the eyes and mucous membranes, and in animals, as a hemolytic agent.[32,33] Phenol and alkyl benzenes have been associated with central nervous system effects such as headaches, drowsiness, and nausea.[33] Sodium hydroxide, which was used in the wallpaper adhesive, is considered to be an irritant of the eyes, mucous membranes, and skin.[33] Formaldehyde is also classified as an irritant and as a possible human carcinogen.[33]

VI. RESULTS

A. Questionnaires/Interviews

One hundred and thirty-four questionnaires were received and analyzed. The results of the comments concerning environmental conditions are presented in Table 1. The most common concerns were lack of circulation (113 [84%]), air too dry (88 [66%]), temperature extremes - too cold (56 [42%]) or too hot (52 [39%]), and dust in the air (45 [34%]). The majority of respondents reported that the environmental problems occurred "all day" (78 [58%]) and daily (54 [40%]).

The self-reported health symptoms that the respondents reported occurring at least twice each week are listed in Table 2. The ten most frequently reported symptoms were headache (54 [40%]), stuffy nose (28 [21%]), runny nose (27 [20%]), sinus congestion (24 [18%]), sore eyes (24 [18%]), fatigue (21 [16%]), coughing (20 [15%]), sneezing (19 [14%]), dry nose (18 [13%]), and chills (16 [12%]). Thirty percent (forty individuals) reported that their symptoms cleared up within one hour after leaving the worksite. Twenty-nine individuals (22%) reported prior health problems that might contribute to their reported symptoms. These health problems included allergies to dust and mold, asthma, bronchitis, and sinusitis.

Eight individuals who requested to speak to NIOSH investigators were interviewed about their perceptions of environmental conditions and any symptoms that might have that they associated with work. The comments were very similar to those obtained by the self-administered questionnaire. Additional issues that caused concern were elevator safety (in June 1991, a elevator car reportedly dropped 15 feet), broken file cabinets, odors from wall papering, dusty grills on exhaust returns, illumination, and ergonomic issues.

B. Environmental

The results of the environmental evaluation are presented in Table 3. It was raining during the day of the survey. All of the indoor CO_2 concentrations were lower than 1000 parts per million (ppm), a guideline suggested by ASHRAE, and ranged from 350 to 650 ppm. Outdoor CO_2 concentrations ranged between 350 to 375 ppm. Indoor temperatures ranged from 75.6 to 82.2°F across all areas measured throughout the day. Relative humidities ranged from 40.9 to 59.2%.

The majority of the temperature and relative humidity pairings were outside the acceptable ranges of operative temperature and humidity shown in Figure 1 which can result in uncomfortable working conditions.[29] The air conditioning systems were functioning. The rainy weather probably contributed to the relatively high humidity inside the building. The temperature and relative humidity remained stable during the workday throughout the work areas.

All samples of vinyl wall covering contained trace concentrations of butyl cellosolve and various alkyl benzenes (such as trimethyl benzene). Trace concentrations of formaldehyde were found in the second sample, and phenol was detected in the third sample.

The results for the water sampling are shown in Table 4. Three trihalomethanes (bromodichloromethane, chlorodibromomethane and chloroform) were detected in the water samples. One chemical was detected in all drinking water samples which could not be identified using this analytical method but it was suspected by the chemist to be sulfur dioxide. All of the substances detected were within acceptable guidelines for drinking water.[31]

The results for the direct readings for CO and petroleum distillates are presented in Table 5. Low concentrations of CO (non-detected to 7 ppm) were detected in the morning, late morning, and afternoon in the loading dock area. No detectable concentrations of CO were found on the third floor. A trace concentration of petroleum distillates was found in the loading dock area.

During the walk-through survey, it was noted that rooms had been added throughout the building in areas that were originally designed as open office space. Partial partitions were also in place on several of the floors. The air-handling unit for the basement and part of the first floor is small and, according to the USPHS/DFOH report did not provide sufficient ventilation (approximately 0.15 cubic feet per minute per square foot of floor space in the training area). The air handling units appeared to be well maintained. In the lower level area, the traps for the cafeteria that had leaked had been replaced. Stained ceiling tiles had been removed but not replaced. The carpet looked like it had been water stained. There was a strong odor of ammonia when the loading dock was being cleaned.

VII. DISCUSSION/CONCLUSIONS

The predominant environmental complaints expressed by employees concerned a lack of air circulation, the air was too dry or too humid, and temperature fluctuations. The most frequently reported symptoms were headache, stuffy nose, runny nose, sinus congestion, sore eyes, fatigue, and coughing.

The CO_2 measurements suggested that the work areas were receiving adequate amounts of outside air on the day of the survey. The areas that were outside the ASHRAE thermal comfort range generally had high temperatures and high relative humidity. The addition of rooms and partial wall partitions without consideration of the ventilation systems on the floors may have caused interference with the air flow patterns. The solvents detected in the vinyl wall covering samples have the potential to cause irritation.[32,33] The direct reading instruments used at the facility did not detect any excessive amount of CO or petroleum distillates. The HVAC systems that were examined were clean of visible microbiological contamination and standing water, and appeared to be well maintained. There was evidence that water had leaked into the lower level area. The drinking water samples collected did not show evidence that the water supply constitutes a health hazard to employees due to VOC content. The sulfur dioxide suspected to be in the water samples is a naturally-occurring compound for which there is no current drinking water standard.

VIII. RECOMMENDATIONS

1) The ceiling tiles should be replaced in the lower level where they are missing and throughout the building if they are stained.

2) All water-damaged soft material (such as carpeting) should be removed from the areas where complaints are occurring. Water-damaged materials often support microbial growth long after they appear dry, and other organic materials (spores, antigens, toxins,and irritants) can remain in such material for years.[30]

3) Broken file cabinets should be repaired. They have the potential to act as trip hazards and can cause abrasions and contusions.

4) Decreasing the temperature and relative humidity in the lower level and on the third through tenth floors should bring those areas into better compliance with ASHRAE guidelines pertaining to thermal comfort.

5) The air flow in the lower level should be reevaluated after the ceiling tiles are replaced to see if there is sufficient air flow. From the prior surveys done by other firms and agencies, there is an indication that the current fan may not be able to move a sufficient amount of air to fall within the ASHRAE guidelines of 20 cubic feet per minute per occupant.

6) The water filtration system appeared to work adequately. There is a potential for water to stagnant in the pipes from the main systems to the water fountains. The fountains should be run on a regular basis to prevent the problem from occurring.

7) The areas where wall paper is being applied should be well-ventilated due to the irritating nature of the substances which might be off-gassing.

8) The supply grills should be routinely cleaned to remove dust from the work environment.

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1. The Harold Washington Social Security Center
2. American Federation of Government Employees, SSA Local 1395
3. OSHA, Region V

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

Table 1

Questionnaire Results-Environmental Complaints
Great Lakes Program Service Center
Chicago, Illinois
August 8, 1991

HETA 91-253

Comments	Number of Reports (% of Total)
Too Cold	56/134 (42%)
Too Hot	52/134 (39%)
Lack of Circulation (Stuffy Feeling)	113/134 (84%)
Disturbing Noises	23/134 (17%)
Air Too Dry	88/134 (66%)
Air Too Humid	14/134 (10%)
Noticeable Odors	40/134 (30%)
Dust in Air	45/134 (34%)

Table 2

Questionnaire Results-Symptoms that Occur More Than Two Times Each Week
Great Lakes Program Service Center
Chicago, Illinois
August 8, 1991

HETA 91-253

Symptoms	Number of Reports (% of Total [134])
Headache	54 (40%)
Stuffy Nose	28 (21%)
Runny Nose	27 (20%)
Sinus Congestion	24 (18%)
Sore Eyes	24 (18%)
Fatigue	21 (16%)
Coughing	20 (15%)
Sneezing	19 (14%)
Dry Nose	18 (13%)
Chills	16 (12%)
Dry Throat	16 (12%)
Dry Eyes	15 (11%)
Sore Throat	15 (11%)
Watering Eyes	13 (10%)
Colds	10 (7%)
Drowsiness	10 (7%)
Thirsty	7 (5%)

Table 3

Indoor Air Quality Data
Great Lakes Program Service Center
Chicago, Illinois
August 8, 1991

HETA 91-253

Location	Time	CO_2 (ppm)	Temp (^oF)	RH (%)	No. of Occupants	Comments
Outside-	6:44	375	69.4	83.5	None	Raining,vehicles
Main Entrance	3:26	350	76.8	74.3	None	running
Basement:						
Training Area-	6:56	350	75.6	59.2	None	Renovations in
Double Room	11:05	400	79.0	52.2	None	progress- no
	2:43	450	78.8	55.3	None	ceiling tiles
Training Area-	7:00	400	76.8	55.5	None	
Corner Room	11:07	400	77.4	54.2	None	
	2:45	450	77.9	56.3	None	
Loading Dock/	7:04	350	79.2	57.2	2	one truck
Security Area	11:10	375	78.1	54.0	2	two vehicles
	2:47	500	78.1	58.4	1	cleaning floor
Third Floor:						
Check	7:44	375	80.8	43.2	5	open area
Processing	11:20	525	82.4	40.9	7	
Area	2:54	600	78.6	46.4	7	
Security/	7:40	425	79.2	44.5	6	central area
Integrity	11:24	525	80.8	42.6	12	
Area	2:56	650	79.5	44.9	14	
Data	7:23	425	79.5	45.3	3	fan in use
Processing	11:25	500	80.1	43.5	8	
Area-Center	2:58	600	79.7	45.7	5	
Data	7:27	375	79.0	46.4	3	fan in use
Processing	11:27	475	79.7	44.3	5	
Area-Rear	3:00	600	79.9	46.4	6	
Data	7:36	375	79.7	44.9	1	partial
Transcribers-	11:29	475	79.3	45.2	3	partitions
Partitions	3:03	550	79.7	46.3	1	
Data	7:34	425	79.0	46.8	10	
Transcribers-	11:32	500	78.3	46.6	11	
Open Area	3:05	550	79.9	46.6	12	

Table 3 (Continued)

Indoor Air Quality Data
Great Lakes Program Service Center
Chicago, Illinois
August 8, 1991

HETA 91-253

Location	Time	CO_2 (ppm)	Temp (^oF)	RH (%)	No. of Occupants	Comments
Fourth Floor:						
Southeast Area	7:48	350	79.2	48.9	12	open area
	11:38	475	82.2	41.8	7	
	3:08	525	78.3	47.3	5	
Southwest Area	7:54	475	79.2	46.6	5	partial
	11:40	450	80.2	45.4	7	partitions
	3:10	500	78.6	46.9	4	
Northwest Area	7:57	350	78.8	44.0	4	open area
	11:42	475	79.3	42.6	3	
	3:12	525	78.8	45.7	3	
Northeast Area	7:59	375	78.4	44.4	5	open area
	11:44	425	79.3	42.4	8	
	3:14	500	79.0	44.7	3	
Eighth Floor:						
Southeast Area	8:05	375	77.9	46.9	6	partial
	11:48	450	77.7	45.7	None	partitions
	3:17	475	77.9	48.7	5	
Southwest Area	8:07	375	78.3	46.0	2	open area
	11:51	450	78.1	46.6	7	
	3:19	575	77.9	48.7	5	
Northwest Area	8:10	375	78.1	45.1	4	open area
	11:54	450	77.2	45.8	5	
	3:21	500	77.9	45.9	3	
Northeast Area	8:13	350	77.9	45.1	6	four printers
	11:56	425	77.2	44.7	6	in use
	3:23	475	77.5	46.5	2	

Table 4

Water Monitoring Results
Great Lakes Program Service Center
Chicago, Illinois
August 8, 1991

HETA 91-253

Sampling Location	Detected Compounds (micrograms/liter-µg/l) Bromodichloromethane	Chlorodibromomethane	Chloroform
1st Floor SW Beside Nurse's Office (First Unit)	ND*	ND	2**
Basement Area Beside Loading Dock (First Unit)	ND	ND	2**
1st Floor West (Second Unit)	ND	ND	ND
Basement Near Contractors Officer (Second Unit)	ND	ND	ND
8th East Corridor (Third Unit)	7.9	2**	19
8th Floor SW End (Third Unit)	7.8	2**	20
Limit of Detection (LOD)	1.0	2.0	0.6
Limit of Quantitation (LOQ)	4.6	5.3	2.1

The Safe Drinking Water Act (SDWA) Maximum Contaminant Level for trihalomethanes is 100 micrograms per liter.

* - Parameter Not Detected

** - Concentration Between LOD and LOQ

Table 5

Direct Reading Instrument Results
Great Lakes Program Service Center
Chicago, Illinois
August 8, 1991

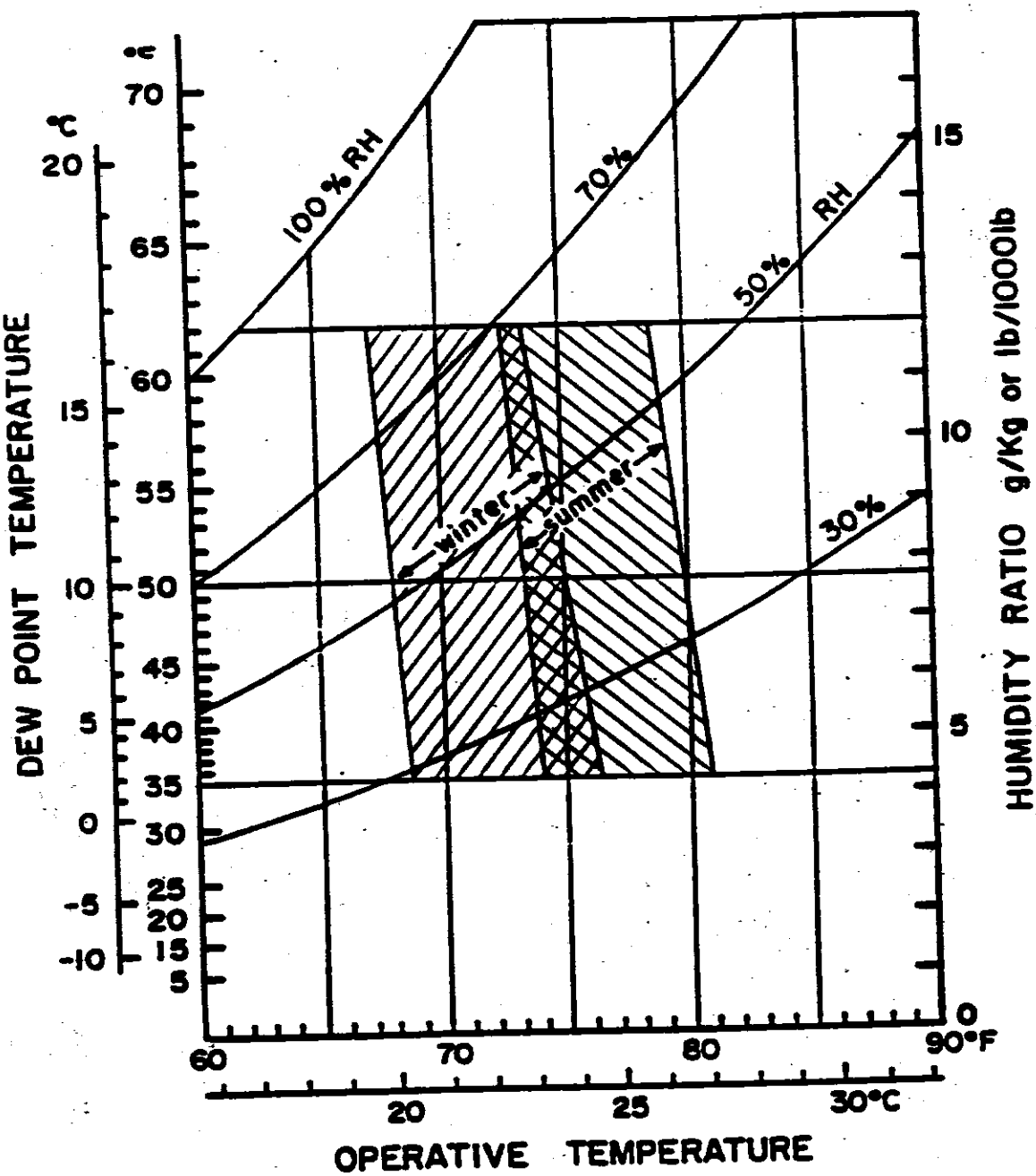
HETA 91-253

Compound	Location	Time	Concentration (parts per million)
Carbon Monoxide:			
	Loading Dock	7:10 a.m.	7
		11:10 a.m.	Trace
		2:47 p.m.	Trace
	Third Floor	7:23 a.m.	None Detected
Petroleum Distillates:			
	Loading Dock	7:10 a.m.	Trace

Figure 1

Harold Washington Social
Security Center

HETA 91-253



Acceptable ranges of operative temperature and humidity for persons clothed in typical summer and winter clothing, at light, mainly sedentary, activity.

Figure courtesy of the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE), Thermal Environmental Conditions for Human Occupancy (55-1981).