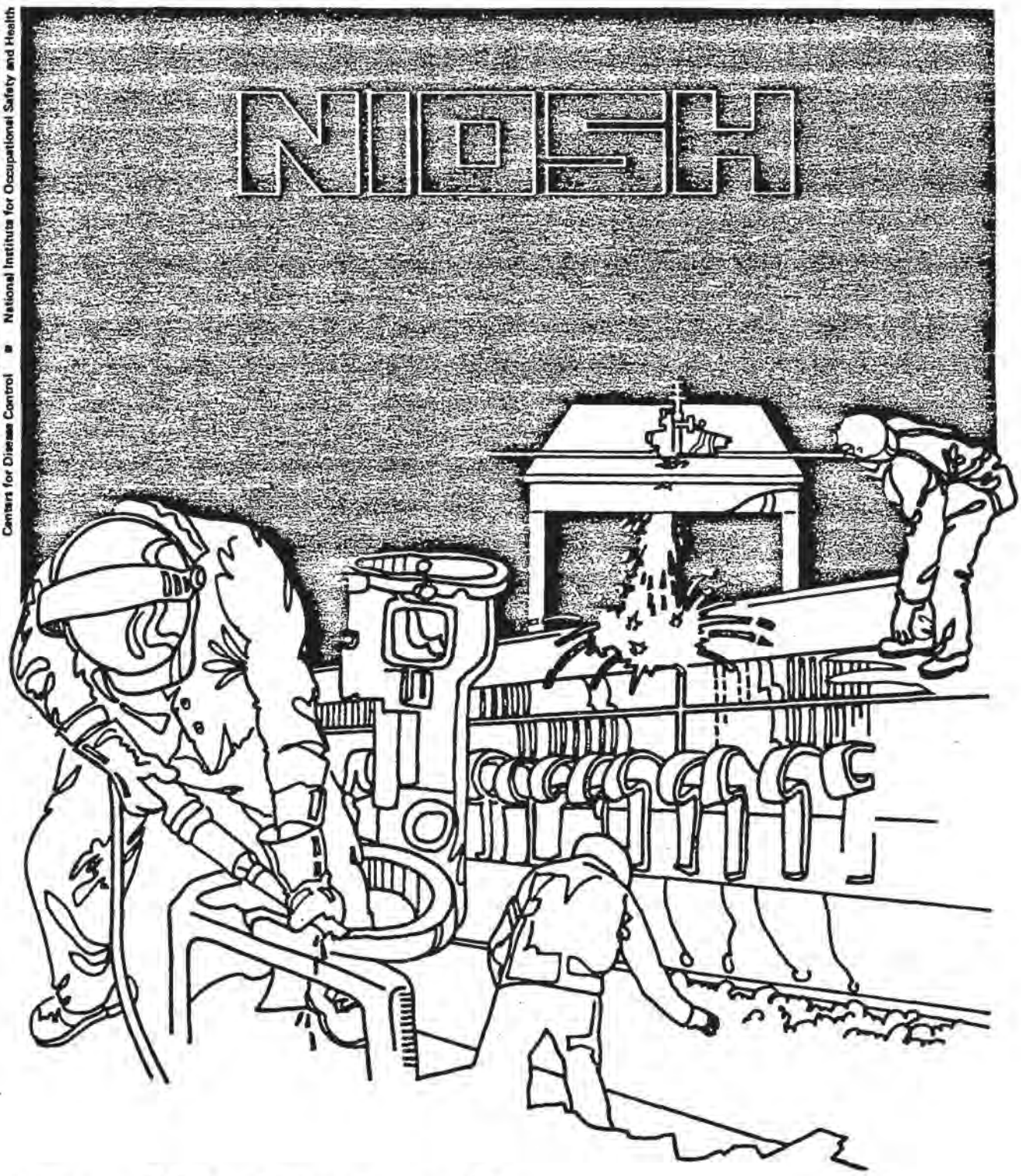
U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES ■ Public Health Service
Centers for Disease Control ■ National Institute for Occupational Safety and Health



Health Hazard Evaluation Report

HETA 82-177-1287
AMERICAN SAVINGS
HONOLULU, HAWAII

PREFACE

The Hazard Evaluations and Technical Assistance Branch of NIOSH conducts field investigations of possible health hazards in the workplace. These investigations are conducted under the authority of Section 20(a)(6) of the Occupational Safety and Health Act of 1970, 29 U.S.C. 669(a)(6) which authorizes the Secretary of Health and Human Services, following a written request from any employer or authorized representative of employees, to determine whether any substance normally found in the place of employment has potentially toxic effects in such concentrations as used or found.

The Hazard Evaluations and Technical Assistance Branch also provides, upon request, medical, nursing, and industrial hygiene technical and consultative assistance (TA) to Federal, state, and local agencies; labor; industry and other groups or individuals to control occupational health hazards and to prevent related trauma and disease.

HETA 82-177-1287
APRIL 1983
AMERICAN SAVINGS
HONOLULU, HAWAII

NIOSH INVESTIGATORS:
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I. SUMMARY

In March 1982, the National Institute for Occupational Safety and Health (NIOSH) received a request to evaluate the air within the main office building of American Savings, Honolulu, Hawaii. Past complaints from several workers have included headaches, stomach problems, respiratory problems, twitching of eyes, and other neurological complaints. One of the involved workers is said to be especially sensitive to pollutants. The problems started when the requester's department was on the 12th floor. At the time there was remodeling in progress on the 8th floor. The department was moved to the 5th floor with some improvement but incomplete resolution of the problems.

On July 26, 27, and 30, 1982, the NIOSH investigators visited the offices to obtain information on the ventilating systems, to interview a sampling of office workers, to inspect offices and the ventilation in them, to obtain detector tube readings for carbon dioxide (CO_2) and carbon monoxide (CO), and to obtain air flow, temperature, and humidity readings.

Although outside, street-level CO_2 levels were in the 0.03%-0.04% range, building levels were uniformly in the 0.06%-0.08% range, mostly 0.06%. CO levels within the building were mostly in the 3-4 parts of CO per million parts of contaminated air (ppm) range. Street level, outdoor air showed only a trace of CO early in the morning, but levels of 4-5 ppm by mid-afternoon. It was concluded that CO levels on the upper floors were primarily due to smoking in some of the offices and could probably be reduced by increasing the fresh air intake. CO levels on the lower floors probably also partially reflect levels in the intake air and so could probably be best reduced by bringing in more fresh air in the earlier part of the day. The fairly uniform distribution of CO_2 and CO indicated that air flow within the building was adequate to keep the building air uniformly mixed.

Relative humidity readings were in the 46%-74% range, and so were not deemed a problem. NIOSH readings on a Tuesday morning showed temperatures as high as 82°F on the 11th floor and as low as 71°F in the afternoon in one office on the 5th floor. These readings and interview results suggested that there was insufficient cooling for the upper floors at the beginning of the day, particularly Monday mornings, and excessive cooling for the lower floors during the day.

Interviews showed that most workers within the building had no complaints (8 of 15) or only temperature-comfort complaints (3 of 15). A few workers appeared to have minor (2 of 15) to more major (2 of 15) adverse health effects from the air in the building. Increasing fresh air and air flow and modifying temperature control should help the situation.

On the basis of environmental and medical data, NIOSH concluded that the ventilation systems in the American Savings Building, Honolulu, Hawaii, were producing less than optimal indoor air quality primarily due to inadequate fresh air intake. A few of the workers interviewed were suffering adverse health effects which would probably be improved by improving air quality. Recommendations for improving air quality are included in this report.

KEYWORDS: SIC 612 (Savings and Loan Association), indoor air quality, temperature, relative humidity, air flow, carbon dioxide, carbon monoxide.

II. INTRODUCTION

On March 22, 1982, the National Institute for Occupational Safety and Health (NIOSH) received a request from a management representative of American Savings, Honolulu, Hawaii, to conduct a health hazard evaluation of stale, dead, thick, dusty air in this office building. Occupant complaints have included headaches, stomach problems, respiratory problems, twitching of eyes, and other neurological complaints. One of the involved workers is said to be especially sensitive to pollutants.

The major problem started in early spring of 1980. At that time the requester and her staff had their offices on the 12th floor. Also at that time there was construction in progress on the 8th floor. The Division of Occupational Safety and Health, Department of Labor and Industrial Relations, State of Hawaii, took air samples using charcoal tubes on March 27, 1980, but found no significant amounts of organic chemicals. Reviewing the various chronologies of events supplied with the request suggests that significant adjustments were made to the ventilation of the office in question on March 19, 1980. Later that spring the Marketing staff was moved to the 5th floor with improvement of symptoms. In January 1981 it was decided the move would be permanent. The hazard evaluation request was submitted because some problems persisted and the requestor was interested in an evaluation of what had happened.

The NIOSH investigators visited the offices on July 26, 27, and 30, 1982, to obtain information on the ventilating systems, to interview a sampling of office workers, to inspect offices and the ventilation in them, to obtain detector tube readings for carbon dioxide (CO_2) and carbon monoxide (CO), and to obtain air flow, temperature, and humidity readings.

III. BACKGROUND

A. Building Layout and Organization

The American Savings Building is a 12 story building built in 1968. The windows do not open. It is part of the Financial Plaza of the Pacific with overall management resting with the Hawaiian Trust Company. This includes contracting for janitorial services which include vacuuming, dusting, and some spot cleaning. Actual space in the buildings is owned as condominiums with American Savings (AS) owning a number of floors in the building and an interest in the Plaza as a whole. Individual tenants are responsible for having their drapes and carpets cleaned.

Building use by floor is:

Basement:	AS storage rooms; maintanence storage and work area within the ventilating unit for the lower floors; a garage which also extends under an adjacent building in the Plaza.
1:	AS bank lobby.
2:	AS - residential loan offices.
3:	AS offices.
4:	State court offices.
5:	AS - marketing and financial services; non-AS attorneys' offices.
6:	Non-AS general offices.

7: Same.
8: Ernest and Winney Accountants general offices.
9: Same.
10: Offices - law firm and real estate developer.
11: Real estate offices.
12: AS - executive offices, lunch room.
Penthouse: Ventilating unit for upper floors, elevator machinery.

Normal working hours: 8:00 AM to 4:30 PM.

B. Ventilating Systems

1. General

In 1977-1978 the ventilating systems were modified by adding fan volume controls. Actual air flow is controlled by cooling needs sensed by a room thermostat serving the zone in question. Air distribution within a zone is controlled by manually adjusting vent openings. A minimum of 1-2 inches of water pressure is maintained in the air ducts at all times assuring at least a minimum air flow. The fan volume controls adjust the main blower fan outputs to maintain the proper air duct pressures. There are four zones per floor, each with its own thermostat located in the main office area of the zone. Air vents are located around some of the light fixtures and in floor units in front of the windows. The floor units are about 3 feet high with the air venting out of their flat top. Air returns above the ceiling tiles with air uptake openings around some of the light fixtures and on the ends where the false ceiling stops just short of the windows. Since individual tenants determine the configuration of their office space, there is a variety of interior wall arrangements.

The two ventilating units have the same general design. There is a smaller air conditioning unit which draws in fresh air exhausting it into a large room or room complex. Return air from the building (except exhaust from the rest rooms which is vented to the outside) also returns to these rooms. The main air handling units are located inside the room and draw the air from the room through a disposable prefilter and bag filters. Prefilters are changed when the pressure drop across them exceeds one inch of water. Filters have been changed about every three weeks due to construction in the vicinity of the building. At other times it has been a little less frequent. The bag filters are also cleaned when indicated by pressure drop, but this has been infrequent. Dehumidification is an integral part of cooling the air, with excess moisture being drained. The units are turned on at 7:00 AM except Sundays and run while the building is in use. Inspection on the walk-through showed the filters to be "clean".

2. Basement Unit

The basement unit serves the basement (except the garage) and the lower six floors. The air intake is located between the building and the street, adjacent to the entry ramp to the garage. The actual openings are horizontal, elevated about 4 feet above ground level. The damper for the air intake unit is open 100% all the time

introducing about 30% fresh air into the air recirculating system. A unique feature of the basement is that the storage room and maintenance storage and work areas are contained within the rooms from which the main air handling unit draws its air. The smaller, fresh air unit supplies the ventilation to these basement rooms.

3. Penthouse Unit

The penthouse unit serves the 7th through 12th floors. The damper on the fresh air unit is run at 20% open when the unit is turned on at 7:00 AM, reduced to 10% open at 9:30 AM, and reduced to 0% open (not a complete seal) at 4:00 PM. The room from which the main unit draws air is not used for anything else.

4. Basement Garage

The basement garage has two exhaust systems which discharge away from the air intakes. Intake air comes in through the vehicle entrance-exit.

IV. EVALUATION METHODS AND DESIGN

A. General

After initial introductions, arrangements were made to meet with the persons responsible for building maintenance and tour the ventilating systems. Further study involved obtaining temperature and humidity readings and detector tube samples for carbon dioxide (CO_2) and, in some cases, carbon monoxide (CO) at a variety of locations. CO measurements were done at most locations in the morning, but at noon and in the afternoon measurements were confined to the air intake and areas where there were smokers. In individual rooms some air flow measurements were taken as well. Occupants of specific offices were interviewed for possible health problems using a general purpose questionnaire.

B. Sampling Locations

Street level air intake for basement unit.
Bank lobby - 1st floor
5th floor by elevators
AS Marketing - Main office - 5th floor
AS Marketing - Vice-President's office - 5th floor
AS Financial Services - Main office - 5th floor
11th floor by elevators
12th floor by elevators
AS Legal - Main office - 12th floor
AS Legal - Ms. Nakamatsu's office - 12th floor
AS lunch room - 12th floor

C. Instrumentation

Temperature and Humidity were obtained using a Bendix model 566-2 Psychron® which measures both dry bulb and wet bulb temperatures. Relative humidity is read from a chart using the difference between the two temperature readings.

Air Flow was measured using a Kurz 440 Series Portable Air Velocity Meter.

Carbon Dioxide (CO_2) was measured using a NIOSH certified Drager Tube - Carbon Dioxide 0.01%/a. With ten pump strokes this tube measures concentrations between 0.01 and 0.3% by volume.

Carbon monoxide (CO) was measured using a NIOSH certified Drager Tube - Carbon Monoxide 5/c. With ten pump strokes this tube measures concentrations between 5 and 150 parts per million (ppm). Twenty (20) strokes were used to get readings approximately half of this range.

NIOSH has certified these gas detector tubes to meet the minimum requirements set forth in Title 42, Part 48, of the Code of Federal Regulations (basically $\pm$ 35% accuracy at one-half the exposure limit and $\pm$25% at one to five times the exposure limit).

V. EVALUATION CRITERIA

A. Ventilation adequacy was estimated from the potential for CO_2 buildup within an occupied area.[1] Air normally contains about 0.03% carbon dioxide. As most living creatures, including man, produce CO_2 as an end product of metabolism, if an enclosed area is occupied and not adequately ventilated, the concentration of CO_2 will gradually build up. The ventilation can further be evaluated by observing how long it takes after occupancy is reduced for the CO_2 levels to return to normal. CO_2 is also produced by combustion, such as smoking. CO_2 levels found in this study would have no health effects.

B. Carbon Monoxide[2] (CO) is produced when carbon containing compounds are burned in a limited air supply. The likely sources in this study would be automobile exhaust and cigarette smoke. Small quantities result from the metabolic breakdown of hemoglobin in man, but the amounts would be too small to measure by the methods used in this study. CO binds to the hemoglobin in the red blood cells 220 to 290 times more strongly than does oxygen. This impairs the blood's ability to carry oxygen to the tissues of the body. The immediate health effects are related to the proportion of hemoglobin which is bound with CO. This proportion in turn is determined by how concentrated the CO is in the air, how long the contaminated air is breathed, and how much air is breathed during the exposure time. (Hard physical work increases depth and rate of breathing.)

Non-smokers usually have 0.3% to 0.7% of their hemoglobin tied up with CO. In smokers this may rise to 5% to 10%. Although there are some circulatory changes at lower levels which could affect individuals with severe cardiorespiratory problems, at carboxyhemoglobin levels of less than about 15% saturation about the only noticeable effect would be a loss of visual sensitivity to light, most noticeable as a decrease in night vision. Above that symptoms include headaches of progressive severity, nausea, decreased manual dexterity and judgment, and at higher levels (50+%) coma, convulsions, and death. Unless severe poisoning has deprived the brain of oxygen long enough to cause damage, recovery is usually complete if the individual is rapidly moved to uncontaminated air and hastened if oxygen is administered.

Three sources of criteria used to assess the workroom concentrations of chemicals are (1) NIOSH criteria for recommended standards, (2) recommended Threshold Limit Values (TLVs) and their supporting documenation as set forth by the American Conference of Governmental Industrial Hygienists (ACGIH), 1980, and (3) Occupational Safety and Health Administration (OSHA) standards (29 CFR 1910.1000), July 1980.

	Permissible Exposure Limits 8-Hour Time-Weighted Exposure Basis
Carbon monoxide.....	35 ppm (NIOSH) 50 ppm (TLV and OSHA)

ppm - parts of gas per million parts of contaminated air by volume.

Occupational health standards are established at levels designed to protect individuals occupationally exposed to toxic substances on an 8-hour per day, 40-hour per week basis over a normal working lifetime.

C. Temperature as experienced in an office building is more a matter of comfort than health risk. Because it is more sociably acceptable to put on extra clothing for warmth than to take off clothing for coolness, workers are more likely to be comfortable in a cooler room if they are prepared for it. Unfortunately in Hawaii this requires more energy. Federal energy conservation dictated offices only be cooled to 78°F. This was generally regarded by the occupants as a little warm for sustained mental activity.

D. Relative Humidity measures how much water vapor is present in the air in relation to how much water air at that temperature could hold if it were completely saturated. Relative humidities in mid range, about 30% to 80%, are the more comfortable. Except at extreme ranges there are no health consequences. Dry air tends to dry the mucous membranes of eyes, nose and throat, but reduce the preception of discomfort due to temperature. Moist air increases the preception of uncomfortable temperatures and reduces the efficiency of sweating as a way of getting rid of excess body heat. Relative humidity will change with temperature changes. During air conditioning, except in very dry climates, the air gets cooled enough to allow water to condense out. The cooled air, which now has 100% relative humidity, then warms up as it cools its surroundings, reducing its relative humidity to more comfortable levels.

VI. RESULTS AND DISCUSSION

A. Air Flow

Air flow was measured in the office of the Vice-President of Marketing, 5th floor; in Thelma's Office, Financial Services, 5th floor; and in the main Legal Office, 12th floor. Additionally the air intake vents were located in the main Marketing Office, 5th floor, and the presence of air flow verified in several other places. In the office of the Vice-President/Marketing, except where blocked, air flow from the window vents was 65-170 feet per minute (fpm), mostly over 100 fpm. Air flow from the light fixture vents were in the 60-120 fpm on one occasion and 290-750 fpm on another occasion. Return air flow at the window uptakes

was 10-25 fpm, and at light fixtures, 5-15 fpm. The Vice-President's Office also had a pedestal fan capable at low setting of putting out an air stream of 350 fpm at the fan and of 100-150 fpm approximately 16 feet down wind. There was also an ionizer on her desk which caused a 5-20 fpm air flow. Building ventilation was measured with both these devices off. In Thelma's Office the window vents only gave 30-50 fpm or no flow, but the light fixture vents gave over 100 fpm. Return air flows were not measured. In the main Legal Office the window vents showed 260-300 fpm flow and the lighting vents 250-300 fpm. Window air return showed 30-50 fpm.

From the air flow measurements made it appeared that air was being adequately circulated in the building as a whole. There were specific problem areas which would be best addressed by appropriate adjustments as described in the recommendations.

The vestibule by the elevators only had provision for air return. Intake air had to come from the office areas which opened into the vestibule. On some floors there was little obstruction to such flow; on other floors partitioning blocked most such air flow (as on the 11th floor).

B. Temperature and Humidity

Temperature, humidity, CO_2, and CO readings are given in Table I for the various sampling sites. Outside, street-level temperature and humidity readings started at a 7:00 AM low of 78.7°F and 74% relative humidity. By mid afternoon the temperature had risen to 83° and the relative humidity dropped to 65%. This particular air intake did not get the sun. Initial temperatures on the lower floors varied from 77°F in the elevator vestibule (which got the morning sun) to 72°F in the office of the Vice-President/Marketing. Over the day the temperatures gradually dropped to 73.5°F to 71° F (again in the Vice-President's Office). Relative humidities in the office areas started at 61%-64% in the morning and dropped to 55%-58% by afternoon. The elevator vestibule started at 56% and dropped to 51% reflecting its slightly higher temperatures.

Temperatures in the upper part of the building were higher. The elevator vestibules (which get the morning sun) were 82° and 81.5°F for the 11th and 12th floor respectively. Over the day the 11th floor dropped to 79°F, but the 12th floor only dropped to 81°F. The offices tested started the day at 75.5°F and dropped to 73-74°F. Relative humidity was in the 53-57% range for the offices and the 46-48% range for the elevator vestibules. The lower humidity in the vestibules again reflects the higher temperatures.

From these findings it appears that the air conditioning system is more than adequate to properly cool and dehumidify the building, perhaps overdoing it on the lower floors. The upper floors appear overly warm first thing in the morning. The lunch room was adequately cooled on our one set of readings, and was said to usually be unoccupied.

C. Carbon Dioxide (CO_2) Levels

Outside, street-level CO_2 levels were in the 0.03-0.04% range. It can be presumed that the air intake at the top of the building contained no more, and probably slightly less, CO_2. The air in the building had CO_2 levels in the 0.06-0.08% range, mostly 0.06%. This was fairly constant throughout the day, with the possibility of a slight rise towards afternoon. The higher levels by the 11th floor elevators probably reflect smoking (alleged to be heavy) in the offices on that floor. The slightly higher afternoon reading in the office of the Vice-President/Marketing is unexplained. The elevated CO_2 levels suggest the building is in equilibrium in that it is able to maintain a fairly stable CO_2 level, but that CO_2 removal is less than ideal as an elevated indoor level is required to reach equilibrium. This also suggests that any other pollutants in this indoor environment would also be present at slightly elevated levels.

D. Carbon Monoxide (CO)

Carbon monoxide levels at the street intake were low in the morning but rose by noon reaching 4-5 parts per million (ppm) by mid afternoon. The lower floors in the building showed 3-4 ppm in the morning, representing a carry over from the previous day. In the one office monitored over the day there was a slight drop by noon with a rise again in the afternoon. Although there was a smoker in this office, it appears that the major source of CO is probably the air intake in the afternoon.

On the upper floors the 11th floor elevator vestibule maintained CO levels of 3-4 ppm all day. The other floors started at a lower level (2-3 ppm). There were said to be a number of smokers on the 11th floor. The afternoon rise in the Legal Office on the 12th floor could relate to the general air circulation without much fresh make-up air, or to smoking in the side office off the Legal Office. It is of note that shortly after use the Lunch Room on the 12th floor did not show any appreciable increase in CO.

E. Individual Questionnaires

Fourteen (14) workers were interviewed in person and one by phone, 6 in the Marketing Offices--the area where the requester works, 6 in the Financial Services Offices--the offices adjacent to the Marketing Offices, and 3 in the Legal Department Offices--which occupy the area formerly occupied by Marketing Offices.

There were no current smokers in the Marketing Offices although there were two ex-smokers. The offices, particularly the Vice-President's, tended to be on the cool side, particularly days other than Mondays. Occasional odors of paint or tar were noted Monday mornings. Other mornings the office of the Vice-President/Marketing tended to smell "stale". One worker complained of frequent headaches ascribed to sinuses--worse in humid weather--and another of occasional headaches in humid weather. One other worker has considerable trouble with respiratory allergies helped by working other than in this building. This particular worker is particularly bothered by "dead" air.

Of the six workers in the Financial Services Offices only one felt she had any adverse effects from the work environment. She felt she was overly fatigued by the end of the day, particularly if it was warm. All noted that the offices tended to be warm and/or musty on Monday mornings, becoming more comfortable in a couple of hours. Two mentioned a paint smell attributed to activity in the basement when working on a Saturday. The odor was gone by Monday. Of the six, two were smokers, one an ex-smoker and three were non-smokers.

All three workers in the Legal Department identified excessively warm temperatures as being a problem, more so in the morning, particularly Monday mornings. Also they identified the air as being stale Monday mornings. One also complained of morning headaches and cigarette smoke coming through the air vents. The group consisted of one smoker, one ex-smoker, and one non-smoker.

VII. CONCLUSIONS

1. There appears to be adequate within-building air circulation to keep the within-building air well mixed. There is need for some adjustments in individual offices and/or zones.

2. The slightly elevated carbon dioxide levels within the building found throughout the day suggest that additional fresh air would be desirable. The carbon monoxide levels suggest the same thing, although for the lower floors at least part of the CO levels may relate to the location of the air intake.

3. Morning cooling on the upper floors is insufficient, particularly on Mondays.

4. Cooling on the lower floors is excessive.

5. Humidity control appears adequate.

6. The location of the maintenance shops and storage is undesirable as any activity involving solvents introduces solvent vapors into the ventilating system for the lower floors.

7. House plants in the offices can contribute to the musty odor noted in the morning as the ventilating system is shut down nights and weekends, thus stopping air circulation.

8. The problems noted by personnel in the Marketing Department while on the 12th floor probably relate to the operation of the ventilating system at that time and the remodeling on the 8th floor.

VIII. RECOMMENDATIONS

1. The ventilating systems should be started earlier in the morning. This will introduce more fresh air into the system. In the case of the lower ventilating system the low CO content of the morning air will be of added benefit. In the case of the upper system this will allow additional cooling time.

2. Additional fresh air should be introduced into the upper system. This will only require scheduling a greater intake at the fresh air unit.

3. Additional fresh air at the lower unit will require some system modification. It would appear that additional fresh air without additional cooling is desirable. Also it appears that slightly greater minimal air flow (duct pressure) would be desirable.

4. Barring moving maintenance from its basement area, careful consideration should be given to the time of day and week that solvents are used in the maintenance shop. Ideally they should only be used when the main ventilating system can be shut off and the basement area vented into the garage.

5. If suitable modifications in the operation of the upper ventilation system can be made, the personnel in the Marketing Department of American Savings may be more comfortable in the upper floors because of the location of the fresh air intake at rooftop level.

IX. REFERENCES

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XI. DISTRIBUTION AND AVAILABILITY

Copies of this report are currently available upon request from NIOSH, Division of Standards Development and Technology Transfer, Information Resources and Dissemination Section, 4676 Columbia Parkway, Cincinnati, Ohio

45226. After 90 days the report will be available through the National Technical Information Service (NTIS), Springfield, Virginia. Information regarding its availability through NTIS can be obtained from NIOSH, Publications Office, at the Cincinnati address.

Copies of this report have been sent to:

1. American Savings.
2. U.S. Department of Labor/OSHA - Region IX.
3. NIOSH - Region IX.
4. Hawaii Department of Health.
5. State Designated Agency.

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

TABLE I

Environmental Measurements

American Savings Building
Honolulu, Hawaii

July 29, 1982

Location	Time	Temperature Dry Bulb °F	Temperature Wet Bulb °F	Relative Humidity %	CO_2 %	CO parts per million
Air Intake, Street Level	7:05	78.7	72.7	74	.03-.04	1-2
	8:05	79.5	72.5	72	.04	trace
	12:43	84	74.5	64	.03-.04	3-4
	15:39	83	74	65	.04	4-5
Bank Lobby, 1st floor	12:45	73.5	65	63	---	---
	15:33	73	64.5	63	---	---
5th Floor, by elevators	8:37	77	66	56	.06	3-4
	12:01	76	64	51	.06-.07	---
	15:28	73	63	51	.06-.07	---
AS Marketing, 5th floor Main office	8:30	73.5	64.5	61	.06	3-4
	11:50	72.5	62.5	57	.06	---
	15:15	72	62	57	.06	---
Vice President's office	8:24	72	63.7	64	.06	3-4
	11:50	72	62	57	.06	---
	15:09	71	61.5	58	.07-.08	---
AS Financial Services, 5th floor	8:46	74	65	61	.06	3-4
	12:06	73	63	57	.06	2-3
	15:23	73.5	63	55	.06-.07	3-4
11th Floor, by elevators	8:58	82	68	48	.08	3-4
	12:14	79	65.5	48	.08	3-4
	15:45	79	65.5	48	.07-.08	3-4
12th Floor, by elevators	9:10	81.5	68	48	.06	2-3
	12:21	81	67	47	.06-.07	---
	15:51	81	66.5	46	.06-.07	---
AS Legal, 12th floor Main Office	9:17	75.5	65	56	.06	2-3
	12:30	75.5	64	53	.06	2-3
	15:55	74	63.5	56	.06	3-4
Ms. Nakamatsu's Office	9:17	75.5	65	56	.06	2-3
	12:26	74.5	63.5	54	.06	---
	16:01	73	63	57	.06-.07	---
Lunch Room, 12th floor	12:37	71.5	65	59	.06-.07	3

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