U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE
CENTER FOR DISEASE CONTROL
NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH
CINCINNATI, OHIO 45226

HEALTH HAZARD EVALUATION DETERMINATION REPORT
HE 79-124-682

ORLANDO INTERNATIONAL AIRPORT
ORLANDO, FLORIDA

April 1980

I. SUMMARY

On July 25, 1979, NIOSH received a request for a health hazard evaluation from the President of the Orange County Police Benevolent Association. The request concerned exposure of airport security personnel (SIC code 4583) to emissions from automobiles, buses and airplanes, which were reported to be causing respiratory problems.

To evaluate the causes of these complaints, an industrial hygiene survey of the worksite was conducted. Area air samples for exhaust components were taken at selected locations along the worksite.

Pre and post shift breath samples were collected and analyzed for carbon monoxide (CO). In addition, interviews were conducted with airport personnel in order to determine if any common symptoms were present.

Area air sampling did not detect concentrations of sulfur dioxide (SO_2), oxides of nitrogen (NO_x), respirable particulate, total volatile hydrocarbons, polynuclear aromatic hydrocarbons (PAH's) or CO expected to cause the reported health complaints. SO_2 values were less than 0.4 mg/M^3, NO_x less than 0.1 mg/M^3, respirable particulate less than 0.2 mg/M^3, total volatile hydrocarbons nondetectable, and PAH's less than 0.2 mg/M^3. Pre-shift CO breath measurements were within normal range for smokers (10-20 ppm) and non-smokers (< 10 ppm) and post-shift measurements did not reveal significant elevations in CO levels. A common symptom pattern was not indicated from private interviews with employees.

Based on environmental and medical data and observations, NIOSH has determined that a health hazard to security personnel did not exist. However, in order to make working conditions more bearable, it is recommended that a more structured inside/outside work regimen be instituted.

II. INTRODUCTION

On July 25, 1979, the President of the Orange County, Florida Police Benevolent Association requested a health hazard evaluation at the Orlando International Airport, Orlando, Florida. The purpose of this study was to evaluate the exposure of airport security personnel to fumes from vehicular exhaust.

III. BACKGROUND

Airport security personnel are engaged in work both inside and outside the terminal building. The inside duties mainly involve monitoring airline passenger flow at security check points. The outside duties include directing automobile and bus traffic, monitoring parking violations and in general providing a security presence. An informal schedule of two hours inside/two hours outside during a shift is in force, however, this schedule generally is not followed. When passenger traffic is heavy or when the security force is shorthanded, security personnel may have to spend up to a full shift outside. It has been reported by employees that outside environmental conditions such as no wind or warmer temperatures seem to exacerbate the respiratory problems.

IV. METHODS AND MATERIALS

Air sampling for components of vehicular exhaust, notably SO_2, NO_x, respirable particulate, total volatile hydrocarbons, and PNA's was conducted according to standard NIOSH sampling and analytical methods.[1-5] Air sampling stations were chosen at intervals along the length of the outside front of the passenger terminal building. Since it was reported that environmental conditions seemed to be worse at one end of the terminal versus the other end, the purpose of the sampling stations was to document any difference in air quality.

The area air samples were collected during the day shift, which covered the periods of heaviest air and ground vehiclar traffic.

Carbon monoxide concentrations were determined by direct reading instruments.[6] Periodic readings of CO were taken along each of the area sampling stations. In addition, pre- and post-shift (or pre- and post-outdoor duty) health measurements were taken on security personel.

V. EVALUATION CRITERIA

Exposure criteria have been developed to evaluate a worker's exposure to toxic substances in an occupational setting. Based on available human and animal studies, and industrial experience, these values represent levels to which it is believed that nearly all workers may be exposed for an eight hour day, 40 hour workweek, throughout a working lifetime, without adverse effect. Table I lists the criteria used in this study and a brief comment on the criteria as it relates to health effects.

RESULTS/DISCUSSION

A. Environmental Sampling

The air monitoring results are presented in Table II. Inspection of Table II shows that no sample for either SO_2, oxides of nitrogen or respirable particulate exceeded recommended exposure criteria. Although these values were derived from area sampling and cannot be directly compared to recommended personal exposure values, the comparative magnitude of these values leads NIOSH to conclude that the potential health risk from these compounds is minimal.

Total volatile hydrocarbons were not detected down to the 0.02 milligram limit of detection. This level of analytical sensitivity is below recommended exposure criteria for any individual hydrocarbon or group of hydrocarbons. Therefore, occupational exposure to total volatile hydrocarbons is not a problem.

Cyclohexane soluble, volatile and particulate PNA's were positive on three of four air samples. Qualitative and quantitative analysis was performed for five PNA's commonly found in air samples. These were fluoranthene, pyrene, benzo(a) anthracene, chrysene, and benzo(a) pyrene. These compounds were not detected respectively, at the 0.0015, 0.005, 0.002, 0.0025 and 0.001 milligram limit of detection. PNA's implicated in the etilogy of cancer were not identified or quantified. Therefore, NIOSH concludes that a health risk due to PNA's in the ambient environment does not exist.

Comparison of air sampling values among sampling stations does not indicate any substantial difference in air quality from one end of the terminal to the other.

Background ambient CO measurements were determined to range from 3 ppm to 5 ppm. Ambient CO levels increased to approximately 13 ppm during 8:50 am to 9:50 am and 11:30 am to noon, two time periods when vehicular traffic is the heaviest. Excursions (brief periods of high CO levels) ranged up to 100 ppm.

Attempts were made to have employees wear personal CO measuring devices in order to more accurately evaluate CO exposure. Employees declined to participate in this endeavor; however, they did consent to pre- and post-shift breath CO measurements. Pre-shift measurements were between 5 and 10 ppm CO for non-smokers, and between 9 and 18 ppm CO for smokers. Post shift measurements showed essentially no increase over the pre-shift baseline (average increase of 1.5 ppm for six non-smokers and 8 ppm for two smokers). The time between the last smoke and CO measurement was not recorded.

It appears that smoking is a greater contributor to CO exposure than the ambient environment.

B. Employee Interviews

Ten employees were interviewed concerning their health status. Five employees indicated that they had health problems which they felt were work related. Of the five, two complained of more frequent colds beginning after work at the airport, one had a cough (mainly in the summer which he attributed to increased humidity), one complained of difficulty breathing due to exhaust fumes, and one complained of headaches and a one time occurrence of bronchitis for which be had to seek medical treatment.

Complaints of more frequent colds may be due to increased exposure to potential carriers of cold viruses rather than to chemical exposure.

The headache complaint and difficulty breathing may be caused by exposure to CO and other exhaust components, although levels of CO and other components were found not to exceed acceptable levels. Individual variation in susceptibility may be a factor.

Medical records pertaining to the single bout with bronchitis the one employee experienced were reviewed. It appears that the employee did have an attack of bronchitis, whether or not it was occupationally related is unknown.

VII. RECOMMENDATION

NIOSH could not document potentially harmful exposure levels from vehicular exhaust nor identify a symptom pattern common among employees. There does not appear to be a health risk from vehicular exhaust to airport security personnel. There are many variables, such as inversions and increased temperature, which could cause increased discomfort to individuals whose thresholds are lower than others. Because of this variation in individual response, it is recommended that the inside/outside work regimen be adhered to on occasions when environmental conditions are bothersome. If susceptible individuals continue to have problems, it may be necessary to transfer them to another job.

VIII. REFERENCES

1. NIOSH Manual of Analytical Methods, Second Edition DHEW (NIOSH) Publication Number 77-157-A, April 1977. P&CAM No. 204.

2. IBID, P&CAM No. 231.

3. IBID, P&CAM No. 127.

4. IBID, P&CAM No. 184.

5. NIOSH Manual of Sampling Data Sheets. DHEW (NIOSH Publication Number) 77-159. March 1977.

6. Ecolyzer Portable Carbon Monoxide Monitor. Energetics Sciences, Inc. 85 Executive Boulevard, Elmsford, New York 10523.

7. "Criteria for a Recommended Standard . . . Occupational Exposure to Sulfur Dioxide". DHEW (NIOSH) Publication Number 74-111. May 1977.

8. "Criteria for a Recommended Standard . . . Occupational Exposure to Oxides of Nitrogen". DHEW (NIOSH) Publication Number 76-149, March 1976.

9. "Criteria for a Recommended Standard . . . Occupational Exposure to Carbon Monoxide". DHEW (NIOSH) Publication Number HSM 73-11000, August 1972.

10. "Threshold Limit Values for Chemical Substances and Physical Agents in the Workroom Environment". American Conference of Governmental Industrial Hygienists (ACGIH), 1979. Box 1937, Cincinnati, Ohio 45201.

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X. DISTRIBUTION AND AVAILABILITY OF DETERMINATION REPORT

Copies of this report are currently available upon request from NIOSH, Division of Technical Services, Publications Dissemination, 4676 Columbia Parkway, Cincinnati, Ohio 45226. After 90 days the report will be available through the National Technical Information Service (NTIS), Springfield, Virginia 22161.

Copies of this report have been sent to:

1. Police Benevolent Association, Orange County, Florida.
2. State of Florida, Department of Labor and Employment Security.
3. Greater Orlando Aviation Authority.
4. NIOSH, RPC Region IV.
5. OSHA, RPC Region IV.

For the purpose of informing the approximately 10 affected employees, the employer shall promptly "post" the determination report for a period of 30 days in a prominent place near where exposed employees work.

Table I

Recommended Exposure Criteria for Airborne Contaminants

Orlando International Airport
Orlando, Florida

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Substance	Exposure Criteria (mg/M^3)	Justification for Recommended Exposure Level
Sulfur Dioxide (SO_2)	1.3 TWA*	For prevention of eye, nose and throat irritation upon inhalation; bronchoconstriction, eye and skin burns upon contact.[7]
Nitrogen Oxides (NO_2/NO)	1.8 ceiling (15)**	For prevention of mucous membrane irritation and pulmonary edema upon inhalation; and eye irritation upon contact.[8]
Carbon Monoxide (CO)	35 ppm TWA 200 ppm ceiling (15)	For prevention of headache, reduced work efficiency and stress upon the heart of individuals with cardiac problems.[9]
Respirable Particulate	5 TWA	To prevent reduced visibility, avoid unpleasant deposits in the eyes, ears and nasal passages, and to prevent skin or mucous membrane injury due to local effects or cleaning attempts.[10]
Polynuclear Aromatic Hydrocarbons	No Exposure	No exposure to those PNA's implicated in the etiology of cancer.
Total Volatile Hydrocarbons	None	No published criteria. Use of any low hydrocarbon exposure value would be appropriate.

* TWA - 8 hour time weighted average concentration.
** ceiling - 15 minute exposure period.

TABLE II
Air Monitoring Data
Orlando Airport
Orlando, Florida
August 23-24, 1979
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Station	Contaminant Monitored	Time Sampled (Min)	Volume Sampled (M^3)	Concentration (Mg/M^3)
1	SO_2	503	0.11	0.3
	NO_2/NO as NO_2	502	0.02	ND
	Respirable particulate	501	0.85	0.0
	Total volatile hydrocarbons	503	0.10	ND
	Cyclohexane soluble, volatile & particulate PNAs	390	0.39	0.1
2	SO_2	500	0.11	0.2
	NO_2/NO as NO_2	500	0.03	0.1
	Respirable particulate	499	0.85	0.0
	Total volatile hydrocarbons	501	0.10	ND
	Cyclohexane soluble, volatile & particulate PNAs	499	0.50	ND
3	NO_2/NO as NO_2	481	0.02	ND
	Respirable particulate	481	0.82	0.0
	Total volatile hydrocarbons	481	0.08	ND
	Cyclohexane soluble, volatile & particulate PNAs	481	0.48	0.1
4	SO_2	487	0.10	0.4
	NO_2/NO as NO_2	487	0.04	0.1
	Respirable particulate	486	0.83	1.2
	Total volatile hydrocarbons	486	0.10	ND
	Cyclohexane soluble, volatile & particulate PNAs	486	0.49	0.1

Limits of detection: SO_2 =.01 Mg NO_2/NO = .002 Mg, total volatile hydrocarbons = .02 Mg
Cyclohexane soluble volatile & particulate PNAs = .005 Mg
Respirable particulate = .01 Mg