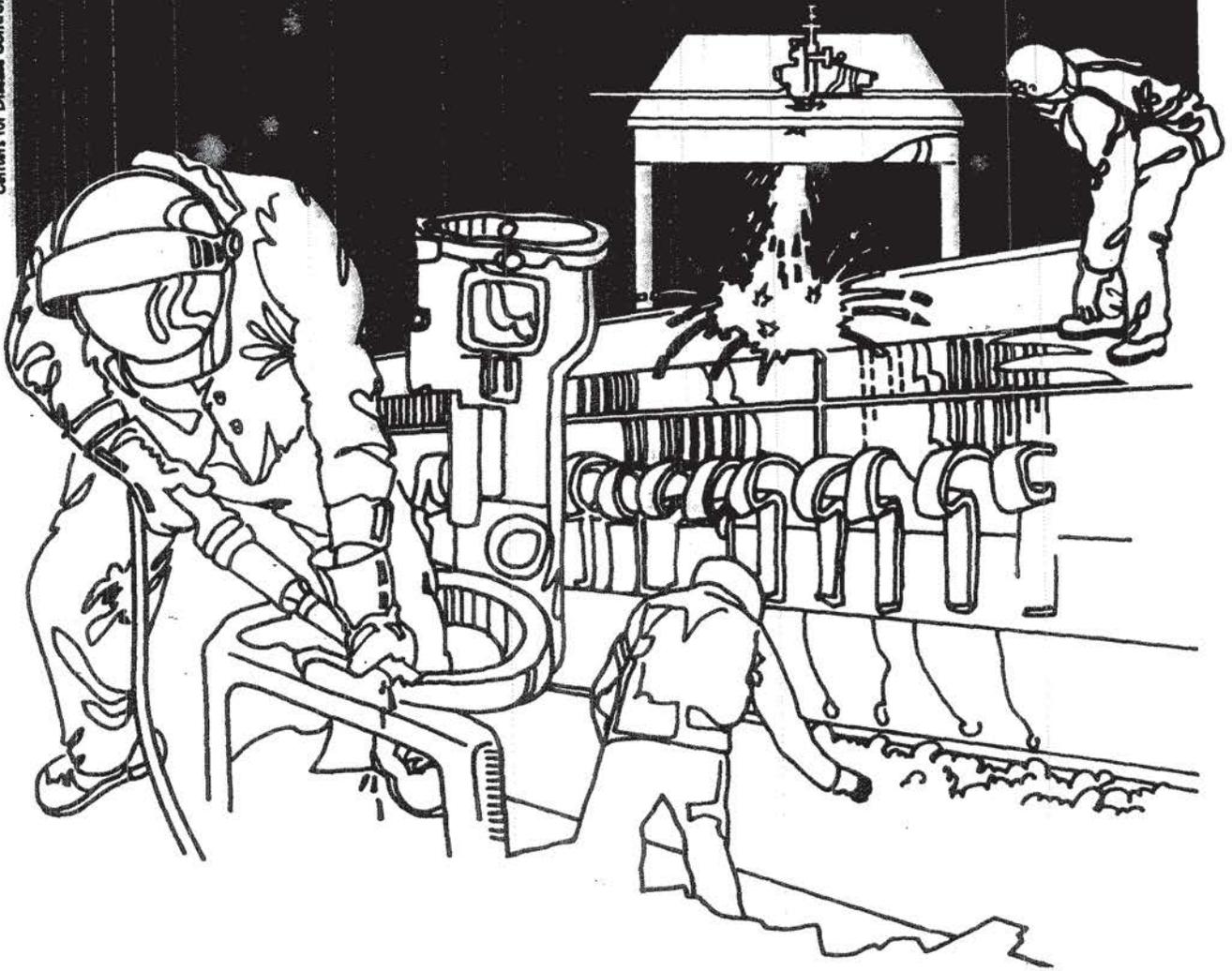


NIOSH



Health Hazard Evaluation Report

HETA 82-100-1349
BRITISH AIRWAYS
KENNEDY AIRPORT
JAMAICA, NEW YORK

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.

Mention of company names or products does not constitute endorsement by the National Institute for Occupational Safety and Health.

HETA 82-100-1349
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BRITISH AIRWAYS
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I. SUMMARY

In January 1982, the National Institute for Occupational Safety and Health (NIOSH) received a request to evaluate reports of itching and dermatitis of exposed skin areas in passenger service agents at British Airways, J. F. Kennedy International Airport, Jamaica, New York.

A NIOSH physican interviewed agents and examined those with dermatological symptoms. An industrial hygienist collected environmental samples of settled and airborne dust which were analyzed to determine the composition of dust in the work environment.

Insect bites and exposure to chemicals were discounted as possible causes of the dermatitis. Analysis of the samples did not indicate exposure to excessive concentrations of fibrous glass or of any other type of dust. The types of particulate identified in the environmental samples cannot be construed as unique or unusual except for an unusual amount of glass particles (5 to 10%) among the particulate.

Seventeen employees with skin complaints were interviewed and examined. Although several different types of dermatoses were noted among the agents, and may be unrelated to the work environment, at least two agents may have had a type of dermatitis similar to that which was reported to be related to working with video display terminals. Dry skin, sinusitis and complaints of low relative humidity were common among the agents.

Based on the results presented in this report, NIOSH concludes that the employees at the British Airways terminal were not exposed to excessive concentrations of airborne dust, and the the types of dermatoses evidenced in the employees varied, although most of the dermatoses may be unrelated to the work environment. Because of widespread complaints of dry skin, sinusitis and low relative humidity, the company should investigate the possibility of maintaining the relative humidity of the terminal at a minimum of 30% and continue surveillance of skin complaints among the employees.

KEYWORDS: SIC 4583 (Airport Terminal Services), Dermatitis, video display terminals, low humidity, indoor air pollution.

II. INTRODUCTION

In January 1982, the National Institute for Occupational Safety and Health (NIOSH) received a request to investigate possible causes of itching and/or dermatitis among passenger service agent working at the British Airways terminal, J. F. Kennedy International Airport, Jamaica, New York. The itching and dermatitis was reported to abate during weekends and vacation periods, indicating that the symptoms were work related. The request was made by several employees. An Interim Report on NIOSH's investigation was made in May 1982.

III. BACKGROUND

About 110 passenger service agents work at the British Airways terminal at Kennedy Airport. Seventy Five percent of the agents are female. The building was first occupied in 1970 and has three levels: the arrival and customs areas are on the ground floor, the passenger service agents' office, the check-in and departure areas are on the main floor and the lounge area and administrative office are on the second floor. The structure is a typical airline terminal: large, airy, and glass fronted. Tempered air is supplied. Another airline leases a small section of the terminal, and their agents are on duty at the terminal for a few hours a day. These agents have not voiced complaints about itching/dermatitis.

The main duties of the passenger service agents are 1) to issue tickets and lift luggage onto the conveyor belts at the rear of the (16) ticket booths, 2) to answer telephone inquiries in the passenger service office, 3) collect tickets at the boarding ramps, and 4) to assist arriving passengers in the arrival area. The only apparent commonality among the work stations is the use of video display terminals (VDTs). The agents did not report any work with chemicals.

There are basically three 8-hour shifts with staggered starting times. The morning shift begins from 6 to 9 AM. Because of scheduling needs relative to overseas flights, the peak traffic periods tend to occur from 7 to 10 AM, 2 to 7 PM and for a few hours around midnight. The passenger service agents may be shifted to any area as the work demands. Most agents work a regular shift, but switching of shifts between agents is commonplace.

Because of the intermittent nature of the itching/dermatitis and the switching of shifts, the number of agents affected is not precisely known, but is estimated to vary from 15 to 40. In 1981/82, ten worker compensation cases for dermatitis were filed by 5 or 6 individual agents.

Some agents report that itching has been a problem at certain work sites (mainly the check-in counters) ever since the building was occupied, others are of the opinion that the problem dates from the Summer of 1981. Some agents believe that the problem is worse in the Winter, some believe that it is worse in the Summer.

At the start of the investigation, the prevailing opinion of the agents was that the itching/dermatitis was caused by insect bites. The terminal handles traffic to and from the Caribbean, and some employees believe that tropical insects have infested the conveyor belt area between the first and second floors. Several years ago, there was an infestation of spiders in the conveyor area, and although there is no record of anyone being bitten by a spider, the memory of that incident may have been the idea behind the "insect theory". Another theory was that of "cable mites"--small insects which live in the computer cables and occasionally bite the agents. A local newspaper actually reported that cable mites exist. No agent has ever reported seeing the insects. The terminal was fumigated several times during 1981/82, but the problem persists.

It is interesting to note that, in July 1982, NIOSH received a similar complaint concerning itching and dermatitis among passenger service agents from the management of another airline terminal about 0.5 mile from the British Airway terminal at Kennedy Airport. The management of that facility had the terminal fumigated and thoroughly cleaned and the complaints stopped.

IV. EVALUATION DESIGN AND METHODS

A. Environmental

As no biting insect was ever seen by the agents, and as the problem persisted after the terminal was fumigated several times, insect bites can be discounted as the cause of the itching/dermatitis among the British Airway agents. One possible etiology concerns the video display terminals which are common to the work sites of the agents. There are several literature reports concerning itching/dermatitis of exposed areas among office personnel who work with VDTs.¹⁻⁵ These reports theorize that, with low relative humidity (less than 30%), the slight static charge on the video display terminal screens act to charge dust particles in the air. The charged particles then tend to impinge on exposed skin and are abraded into the skin, resulting in itching and dermatitis.

In 1980/81, NIOSH investigated a similar problem of itching/dermatitis among office personnel who worked with video display terminals (HE 81-058). The problem at that facility began soon after new fibrous glass insulation had been installed in part of the office. As in this case, the employees of the office had attributed their itching/dermatitis problems to the bites of unseen insects. A small amount of fibrous glass particles was found to be present in the atmosphere of that office. The relative humidity of the office was approximately 25 to 35% at the time of the investigation, and the screens of the VDTs supplied the static electricity charge. That facility thus fulfilled all three criterion for the potential for the itching/dermatitis to be related to the use of VDTs.

The ventilation system of the British Airways terminal was overhauled in the Spring/Summer of 1981. New fibrous glass air filters were installed. A small amount of fibrous glass particles may have been released into the terminal's atmosphere. The screens of the VDTs have a small electrostatic charge. Heating of normally dry Winter air will tend to produce low relative humidity in the terminal.

As the itching/dermatitis tended to abate during non-work periods, and no chemical exposure occurred among the agents, it was decided to investigate exposure to fibrous glass and the relative humidity conditions at the terminal to determine if the itching/dermatitis might be related to these exposures. Another possible source of airborne dust may be generation of rubber and steel particles from the (partially frayed) conveyor belts as they emerge from beneath the floor, near to the agents' work stations at the check-in booths. The conveyors were thought to be a less likely source of contamination, as the symptoms were reported to occur when agents were assigned to work stations which were removed from the conveyors. However, identification of rubber and steel particles among the dust particles in the samples would indicate if the conveyors were a source of dust generation.

Because the concentration of airborne dust was expected to be minimal, it was decided to collect samples of airborne dust for particulate identification. High volume area air samples were collected on Millipore AA filters using open-faced filter cassettes at a sampling rate of approximately 20 liters of air per minute. Temperature and relative humidity also were measured.

Fourteen high volume samples were collected in various locations (check-in booths, the cash payment booth, arrival desk) to determine the composition of airborne particulate. The total sampling volumes ranged from 1,000 liters to 4,000 liters (40 cubic feet to 135 cubic feet) of air. Three wipe samples of settled dust were collected (at the arrival desk, several check-in counters and the agents' office).

B. Medical

The medical evaluation consisted of personal interviews conducted by a NIOSH occupational health physician in January 1983. Employees were questioned about health symptoms, work history, work locations, time spent using VDTs, type of clothing worn, and general impressions of the work environment. The physician also examined the dermatoses of those agents on duty during the morning shift to determine if they conformed to the type of dermatitis reported in the literature. The dermatitis reported in the literature to be associated with VDT usage was described as consisting of erythema and papules on the face somewhat analagous to rosacea. One agent who was said to be especially affected, but who was not on duty that day was interviewed by telephone.

V. EVALUATION CRITERIA

A. Environmental Criteria

As a guide to the evaluation of the hazards posed by workplace exposures, NIOSH field staff employ environmental evaluation criteria for assessment

of a number of chemical and physical agents. These criteria are intended to suggest levels of exposure to which most workers may be exposed up to 10 hours per day, 40 hours per week for a working lifetime without experiencing adverse health effects. It is, however, important to note that not all workers will be protected from adverse health effects if their exposures are maintained below these levels. A small percentage may experience adverse health effects because of individual susceptibility, a pre-existing medical conditions, and/or a hypersensitivity (allergy). In addition, some hazardous substances may act in combination with other workplace exposures, the general environment, or with medications or personal habits of the workers to produce health effects even if the occupational exposures are controlled at the level set by the evaluation criterion. These combined effects are often not considered in the evaluation criteria. Also, some substances are absorbed by direct contact with the skin and mucous membranes, and thus potentially increase the overall exposure. Finally, evaluation criteria may change over the years as new information on the toxic effects of an agent become available.

The primary sources of environmental evaluation criteria for the workplace are: 1) NIOSH Criteria Documents and recommendations, 2) the American Conference of Governmental Industrial Hygienists' (ACGIH) Threshold Limit Values (TLV's), and 3) the U.S. Department of Labor (OSHA) occupational health standards. The OSHA standards also may be required to take into account the feasibility of controlling exposures in various industries where the agents are used; the NIOSH-recommended standards, by contrast, are based solely on concerns relating to the prevention of occupational disease. In evaluating the exposure levels and the recommendations for reducing these levels found in this report, it should be noted that industry is legally required to meet only those levels specified by an OSHA standard.

A time-weighted average (TWA) exposure refers to the average airborne concentration of a substance during a normal 8- to 10-hour workday. Some substances have recommended short-term exposure limits or ceiling values which are intended to supplement the TWA where there are recognized toxic effects from high short-term exposure.

Fibrous Glass

The American Conference of Governmental Industrial Hygienists (ACGIH) recommends a Threshold Limit Value for exposure to fibrous glass dust of 10 milligrams per cubic meter of air (mg/M^3). The Occupational Safety and Health Administration (OSHA) has established a Permissible Exposure Limit (PEL) of 15 mg/M^3 . NIOSH recommends that exposures be limited to 3 fibers per cubic centimeter of air (f/cc) for fibers with a diameter equal to or less than 3.5 micrometers in diameter and a length equal to or greater than 10 micrometers. Concentrations of total fibrous glass dust shall not exceed 5 mg/M^3 as a time weighted average.

Among the health effects that have been observed from fibrous glass exposure are skin, eye and upper respiratory tract irritation. Dermatitis due to fibrous glass consists of itching and burning of the

skin at the site of contact, followed by erythema (redness), localized swelling and small, discrete papules. This dermatitis is likely caused by mechanical irritation; however, fabricated fibrous glass products usually are coated with chemical binders and lubricants which may cause primary chemical irritation⁶.

The amount of dermatitis related to fibrous glass exposure does not necessarily correlate with the airborne concentration of fibrous glass fibers. The dermatitis is probably due more to skin contact with fibers which have settled on work surfaces than to contact with airborne fibers. The amount of dermatitis would depend on housekeeping practices as much as on the overall air concentration of the fibers, particularly when the source is intermittent or when the airborne concentration is minimal,

VI. RESULTS AND DISCUSSION

A. Environmental

The existence of cable mites is a myth. The common paper louse (psocid) is commonly found in buildings wherever paper is used. Psocid lacks a developed mouth and is incapable of biting humans. Entomologists contacted by NIOSH stated that psocids are not known to cause dermatitis in humans.

The concentrations of total airborne dust and of fibrous glass was, as expected, well beneath the evaluation criteria of NIOSH, OSHA and ACGIH. In order to determine the types of dust particles present in the terminal, the samples were analyzed by both optical (polarized light and phase contrast) and transmission electron microscopy.

Fourteen airborne and three bulk samples were analyzed. Two samples (a sample of airborne dust, collected in the cash payment booth, and a wipe sample collected in the agents' office) showed trace amounts of fibrous glass. The primary components found in the samples were aluminum silicates (clays), iron silicates, gypsum, plant and paper fragments, trichomes (algae) and starch grains. Minor components included calcium phosphates, aluminum silicates, various oxides and carbonates, and crystalline and amorphous silica. All of these compounds are naturally occurring minerals and particles commonly found in soils and wind-blown dust. Paper fragments are commonly found in office environments. No mite bodies were observed. Rubber and steel fragments were not found, indicating that fragmentation from the conveyor belts does not add measurably to the total dust of the environment. The only anomaly was the presence of a significant number (from 5 to 15%) of glass shards or fragments on many of the samples. In theory, exposure to small glass fragments could lead to itching and dermatitis through mechanical abrasion of the particles on the skin. A source for airborne glass particles is not known. Several of the large plate-glass windows were destroyed by a bomb at the time of first occupancy of the building in the early 1970s. It is considered highly unlikely that this could be a source, 10 years after the incident.

The relative humidity at the time of the survey was approximately 45%, however the weather was cold and damp and the doors to the terminal were open a great deal due to the number of passengers arriving at the terminal. The temperature at the check-in counters was in the low 60°F range. The New York City area usually experiences low relative humidity in the Winter months, and complaints of dryness, dry skin and sinusitis are common during that time. The American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE) recommends that temperatures be about 73 to 77°F and relative humidity be between 20 to 60% for general comfort.

B. MEDICAL

Fifteen passenger service agents (12 female and 3 male), the passenger service manager and the shift supervisor were interviewed. It was a "slow" period and only about 20 passenger service agents were on duty. The length of service of the employees to British Airways ranged from 9 months to 16 years. All worked with the VDTs for up to ten years (since installation of the VDTs). Of the 17 persons interviewed, 9 had skin complaints, 2 had no complaints, and 6 had several complaints concerning uncomfortable temperatures, low humidity and job stress.

The complaints were as follows:

1. Itching rash on the face (both cheeks) and some irritation of the skin of the arms over the past year.
2. "Reaction" on the face "which itches when close to the computer".
3. Itchy rash on the right hand and spots on the left hand which disappear on days off work; some discoloration on the forearms spreading to the elbows; cracking of the skin with bleeding, worse in the Summer. This condition has been improved by using hand cream.
4. Sporadic episodes of itchy spots lasting for 2 to 3 days, all over body, legs and face. Sinus problems in summertime.
5. "Hot rash" on the skin 2 years ago attributed to "bug bites", pimples and sores on the skin that do not heal. Occurrence depends on the weather.
6. "Bites on the skin last summer". Red bumps on the face. Dry sore skin at the end of the day. Poor air in the terminal building. Sinus problems.
7. Hives last summer. Possible allergy to food or mite bites. Unrelated to VDTs or work.
8. Peeling of the fingertips of both hands for the past 3 months. "Possibly related to a sensitivity to baggage tags". Under investigation at the time of interview by a dermatologist. No VDT related symptoms.

9. Small scabbed lesions of the right forearm and left calf which itch especially at night. Seen by a dermatologist and attributed to anxiety and seemingly unrelated to VDT use.

The passenger service manager and the shift supervisor had noted an increase in complaints of itching during the past year. The building has no humidification system.

In the past few years, there have been reports in the literature of facial rashes associated with working with VDTs. Telephone operators in Norway were noted to have an itchy facial rash induced by continuous work at VDTs. The rashes occurred during periods of low humidity and troublesome electrostatic phenomena. The rash was reproduced by provocation exposure of the workers to VDTs and it has been suggested that these effects may be a result of increased deposition of electrically charged particles in the air onto the skin⁷.

NIOSH has learned of skin rashes occurring among Canadian airline workers attributed to handling flight coupons and the poor ventilation, low humidity and excessive dust in airports (personal communication).

Even though many of the employees attributed their skin symptoms to insect or mite bites, this is considered unlikely because of lack of observation of insects, and periodic fumigation of the facility.

VII. Recommendations

Results of the environmental sampling indicates that there is no substantial exposure to airborne particulate, but the presence of airborne glass particles is puzzling and may be associated with the skin symptoms of the agents. Although the symptoms observed varied widely, and may be unrelated to the work environment, at least two of the individuals observed may have conditions related to the work situation. Since there has been an observable increase in "skin" complaints among the agents, the following recommendations are made.

1. Airborne dust particles may become electrically charged by the static electricity from the screen of the VDTs. Even though there is little evidence of this occurring at the British Airways terminal, it was noticed that the areas near to the VDT cables in the agents' office and at the check-in booths were dusty. These areas should receive periodic vacuuming to decrease the generation of airborne dust.
2. Because of widespread complaint of dry skin, sinus problems, and low relative humidity, the possibility of providing humidification to the terminal should be investigated. For general comfort, relative humidity should be maintained at a minimum of 30%.
3. Surveillance of skin complaints, especially on exposed areas, should be maintained.

VIII. REFERENCES

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IX. AUTHORSHIP AND ACKNOWLEDGEMENTS

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2. British Airway, JFK Airport, Jamaica, N.Y.
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