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

HEALTH HAZARD EVALUATION DETERMINATION REPORT
HHE 80-88-698

EASTERN AIRLINES
MIAMI INTERNATIONAL AIRPORT
MIAMI, FLORIDA 33148

June 1980

I. SUMMARY

The National Institute for Occupational Safety and Health investigated the appearance of red spots on the skin of Eastern Airlines flight attendants. During January 1 to March 10, 1980, there were approximately 150 reports of red spots occurring among these flight attendants. The spots were noticed mainly during or shortly after flights on the New York-Miami route. Although some reports mentioned burning, nausea, and headache in association with spots, most reports involved only the occurrences of bright red spots that could be wiped or washed off. Examination of cases showed that the spots did not consist of blood as was previously thought, and that the underlying skin was intact. Studies of the work practices and procedures of flight attendants revealed that the red spots were caused by red ink flaking off from demonstration life vests used by attendants prior to each flight. The ink contained a lithol rubine-chrome molybdate orange pigment complex dispersed in an organic polymeric vehicle. Since the demonstration life vests have been removed, no cases have appeared.

The Eastern Airline flight attendants were not exposed to toxic concentrations of any component of the ink formulation.

II. INTRODUCTION

Under the Occupational Safety and Health Act of 1970*, the National Institute for Occupational Safety and Health (NIOSH) investigates toxic effects of substances found in the workplace. An authorized representative of Local 553, Air Transport Division of the Transport Workers Union of America requested that NIOSH conduct a Health Hazard Evaluation concerning the appearance of red spots on the skin of Eastern Airlines (EAL) flight attendants (FA's) during various flights. The spots appeared as small drops of red liquid on exposed skin areas. Complaints of symptoms accompanying the spots were rare, but some FA's expressed concern that the spots were caused by bleeding through the skin and might indicate a serious health hazard. On March 12, a NIOSH investigation was begun in collaboration with the Center for Disease Control (CDC). The results of this combined investigation have been summarized previously[1].

III. BACKGROUND

Eastern Airlines medical personnel had examined several persons with the red spots and obtained swabs and scrapings as clinical specimens. No evidence of damage to underlying skin was noted on these examinations, nor was any damage noted by a consultant dermatologist who examined affected FA's after the spots had disappeared. Chemical tests on clinical specimens for the presence of blood were negative. Airline personnel had investigated the ventilation systems, cleaning materials and procedures, and other environmental factors on affected aircraft. Air-flow patterns and cabin temperature, pressures, and relative humidity were found to be normal. Cleaning materials and routines had been changed, but cases continued to occur.

IV. HEALTH HAZARD EVALUATION

Equipped with this background information, a NIOSH-CDC investigation team consisting of two physicians and an industrial hygienist attempted to determine a common etiologic factor. Written reports of 132 cases occurring in January and February showed that 91 different FA's had been affected, 68 once and 23 several times. Of these cases, 119 (90%) had occurred on a single type of aircraft. Of the 119 cases from the implicated aircraft, 96% occurred on north and south bound flights between the New York City and Miami metropolitan areas, flights that are

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*Section 20(a)(6) of the Occupational Safety and Health Act of 1970, 29 U.S.C. 669(a)(6), authorizes the Secretary of Health and Human Services, following a written request by an 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.

partially over water. Only rarely was a case reported from the same airplanes when flying transcontinental or on other east-west routes. Because red spots on the skin are common, a case was defined as red spots that could be removed by wiping or washing. Using this case definition, further analysis showed that there was no correlation between individual attack rates and measures of long term exposure to aircraft environments; FA-passenger ratios; work station of FA during flight, i.e., galley area, forward vs. rear cabins; kind of foods eaten before or during flights; types of cosmetics used; aircraft load factors; and aircraft maintenance history.

To identify potential environmental sources of the red-colored substance, the NIOSH-CDC investigators observed the standard work practices and procedures of FA's on board the implicated aircraft. Because the New York to Miami flights are partially over water, the FA's are required to routinely demonstrate the use of life vests. Usually the senior FA makes the announcement, while the junior staff demonstrates the emergency equipment. Because the vests used for demonstrations were not actually functional, they were stenciled with bold red stripes and the words "DEMO ONLY" on both sides. When the vests were demonstrated, the red ink areas came into close contact with the face, neck, and hands of the demonstrator. Noting that the red ink rubbed or flaked off easily, the investigators used the red ink from the vests to elicit a typical clinical picture. The preliminary hypothesis - that the red ink was the etiologic agent - was supported by the subsequent analysis of the data which showed that the junior FA's had the highest attack rates. Chemical analysis showed that the ink from the model vests matched the red substances found on the faces and hands of FA's affected with the spots. The ink contained two conventional pigments dispersed in an organic polymeric vehicle serving as the binder system. The pigments included chrome molybdate orange and lithol rubine - a calcium salt of an azo pigment. The binder system was composed of a nitrocellulose lacquer and a rosin modified phenolic resin.

On March 15, the NIOSH-CDC team reported its findings to EAL's flight surgeon, coupled with the recommendation that the demonstration vests be removed. On March 15 and 16, EAL's removed all demonstration model life vests from its aircraft and instructed FA's to use the standard, functional passenger vests for demonstration purposes. Since removal of the vests, no new cases have been reported. The airline will continue to request reports of cases to verify the effectiveness of this action.

The lead chromate component of the molybdate chrome orange in the ink has been reported to cause cancer in laboratory animals. On the basis of the very limited quantities of this component that could have been inhaled or ingested by the flight attendants, it is concluded they would have no appreciable increased risk of cancer due to exposure to lead chromate.

The potential health effects from periodic fumingation of the aircraft, variation in cabin humidity, etc., were expressed by some flight attendants. Since the investigation was directed at identifying and eliminating the etiologic agent responsible for the red spots, these concerns were not investigated beyond determining if a correlation existed between them and the appearance of the red spots. These flight attendants are urged to submit a request for a NIOSH Health Hazard Evaluation.

V. REFERENCES

1. Center for Disease Control, Morbidity and Mortality Weekly Report. Vol. 28, No. 16, April 27, 1979.

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VII. DISTRIBUTION AND AVAILABILITY OF REPORT

Copies of this Determination Report are currently available upon request from NIOSH, Division of Technical Services, 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), 5285 Port Royal Road, Springfield. Virginia, 22151. Information regarding its availability through NTIS can be obtained from the NIOSH Publications Office at the Cincinnati address.

Copies of this report have been sent to:

1. Flight surgeon, Eastern Airlines, Miami International Airport, Miami, Florida 33148.

2. Financial Secretary-Treasurer, Local 553, Transport Workers Division, Transport Workers Union of America, 5705 N.W. 38th Street, Miami Springs, Florida 33166.

3. U.S. Department of Labor - OSHA, Region IV.

4. NIOSH Regional Program Consultant, Region IV.

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