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

HEALTH HAZARD EVALUATION DETERMINATION
REPORT NO. 77-102-434

TERMINAL B
TRANS WORLD AIRLINES, INC.
KANSAS CITY INTERNATIONAL AIRPORT
KANSAS CITY, MISSOURI

OCTOBER 1977

I. TOXICITY DETERMINATION

The following determinations have been made based upon environmental air samples collected on August 16, 1977, analysis of three bulk samples of insulation, and available toxicity information:

A. Employees' exposure to airborne asbestos fibers was less than NIOSH's revised recommended standard of 0.1 fibers greater than 5.0 microns in length per cubic centimeter (fibers/cc) on an eight-hour time-weighted average (TWA) basis at the time of the survey. All of the eleven (11) personal and seven (7) general area air samples were reported as less than 0.05 fibers/cc which is the lower limit of detection for asbestos.

B. All three (3) bulk samples of the insulation obtained in the ramp areas showed the insulation used in these areas to contain forty-five (45) percent asbestos. Therefore, there may be a potential exposure of employees to airborne asbestos during certain operations (e.g., maintenance, etc.) or after aging of the asbestos.

Detailed information concerning the results of this evaluation are contained in the body of the report. Some recommendations are also included to alleviate any potential hazards noted during the survey.

II. DISTRIBUTION AND AVAILABILITY OF DETERMINATION REPORT

Copies of this Determination Report are currently available upon request from NIOSH, Division of Technical Services; Information 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:

a) Trans World Airlines, Inc; Kansas City, Missouri
b) Authorized Representative of Employees
c) Safety Director, International Association of Machinists and Aerospace Workers
d) U.S. Department of Labor - Region VII
e) NIOSH - Region VII

For the purpose of informing the approximately 250 "affected employees", the employer shall promptly "post" for a period of 30 calendar days the Determination Report in a prominent place(s) near where exposed employees work.

III. INTRODUCTION

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, Education, and Welfare, 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.

The National Institute for Occupational Safety and Health (NIOSH) received such a request from an authorized representative of Local 1650 of the International Association of Machinists and Aerospace Workers regarding the employees' potential exposure to airborne asbestos fibers.

IV. HEALTH HAZARD EVALUATION

A. Description of Process - Conditions of Use

Bulk samples of insulation used on the structural underside (e.g., steel "I" beams, etc.) of the public service level floor or ceilings of the ramp level of Terminal B were previously obtained for analysis of asbestos by both the union and the industrial hygienist of Trans World Airlines, Inc. Although not all samples indicated the presence of asbestos, the majority showed that the insulation contained approximately 25 percent asbestos. The possible route of exposure would be the flaking off of asbestos fibers or insulation from the ceiling, knocking chunks of insulation off the ceiling while retrieving jammed baggage from conveyor belt to main floor, and during maintenance operations such as installation of ceiling anchors-holders for running service lines or pipes. The main areas of exposure would be the baggage room (busiest is baggage room #2), vehicle-maintenance shop, and the tunnel areas. Trans World Airlines has issued a "Facilities and Maintenance Policy Directive" concerning the handling and disposal of asbestos-containing materials. However, this directive was not followed during removal of insulation at the time of the survey.

B. Evaluation Progress and Methods

An environmental survey was conducted at Terminal B, Trans World Airlines, Inc.; Kansas City International Airport, during the day shift and twilight shift on August 16, 1977. Samples were collected to give both personal exposures and general area air levels in the work area. Three bulk samples (maintenance shop, baggage room, and tunnel area) were obtained and analyzed for percent asbestos.

Air samples were collected on 0.8 micron pore size mixed cellulose ester filters using MSA Monitaire Personal Samplers or Millipore vacuum-pressure pumps operating at 1.7 and 9.1 liters per minute, respectively. Samples were subsequently evaluated microscopically using a phase-contrast microscope technique.[1]

C. Evaluation Criteria

The primary source of environmental criteria considered in this report is the NIOSH Revised Recommended Asbestos Standard (December 1976). NIOSH recommends that occupational exposure to all types of asbestos be controlled so that no worker will be exposed to airborne concentrations of asbestos in excess of 0.1 fibers over 5 microns in length per cubic centimeter on an eight-hour time-weighted average (TWA) basis. In addition, no worker will be exposed to peak concentrations in excess of 0.5 fibers per cubic centimeter of air based on a fifteen minute sampling period.

Previously, in a criteria document transmitted to the Occupational Safety and Health Administration (OSHA), U. S. Department of Labor, on January 21, 1972, NIOSH recommended that occupational exposure to asbestos be limited to 2.0 fibers over 5 microns in length per cubic centimeter of air determined as a time-weighted average exposure for an 8-hour workday, and to a peak concentration of 10 fibers over 5 microns in length per cubic centimeter determined by a minimum sampling time of 15 minutes (presently, the OSHA standard as of 7/1/76 and covered in 29 CFR 1910.1001). That recommended standard was designed primarily to prevent asbestosis. Recognizing that there was then insufficient information to establish a standard to prevent such other asbestos-related diseases as pulmonary, pleural, and peritoneal neoplasms, NIOSH had included in its calculations a safety factor intended to guard against neoplasms more adequately than unmodified environmental limits based solely on prevention of asbestosis. Currently, it is not possible to establish a safe exposure level for the carcinogenic activity of asbestos.

D. Environmental Results

Table I shows the results of eleven (11) personal and seven (7) general area air samples obtained during the environmental survey. All sample results were reported as less than 0.05 fibers/cc which was the minimum detectable level in the NIOSH laboratory for asbestos during this analytical evaluation. The maximum potential exposure from any operations would be during installation of the ceiling anchors-holders in the ceiling of the tunnel (knocking small chunks of insulation from the ceiling) by the plumbers, and dry sweeping of ramp areas by the janitor. In addition, an area sample was obtained from the ceiling exhaust duct from the garage-maintenance area of the ramp and we would expect this sample to indicate the presence of asbestos if there was any significant flaking of the insulation. No short-term samples or 15 minute sampling period were obtained by the NIOSH investigator to ascertain if the ceiling value of 0.5 fibers/cc was exceeded as it was felt that the exposures were at the minimum detectable levels for a 2 hour or more sampling period.

Each of the bulk samples (i.e., maintenance-garage area, baggage room #2, and tunnel area) of insulation showed that the insulation contained approximately 45 percent asbestos. Therefore, there is a potential for exposure of employees to airborne asbestos.

E. Conclusions and Discussions

In view of the above, it is concluded that there is a potential exposure of employees to airborne asbestos as the insulation contains 45 percent asbestos fibers. It is further concluded that employees were not exposed to airborne asbestos exceeding the environmental criteria of 0.1 fibers/cc of asbestos. Operations evaluated at the time of the survey did not pose or indicate an immediate hazard to asbestos.

Recent NIOSH publications[2,3] which reviewed asbestos-related literature reported one paper[4] that indicated an excess mortality from lung cancer was found in 65 men who had been exposed to an unmeasured concentration of amosite asbestos for less than one month thirty years previously. The mortality rate was determined on an age-specific basis.

This paper is mentioned to point out two items: (1) The latency period for asbestos may well extend between 20 and 40 years. This means that the disease may undergo a long development before a tumor is actually detected. At such a point a tumor will have reached a stage where removal of the worker from the workplace may be of no avail and where treatment may be extremely difficult, and with limited success; and (2) Short construction jobs may present a very real hazard.

Prudent policy would, therefore, dictate that every reasonable measure should be taken to limit exposures and provide early detection of developing medical problems.

Because it is not possible to specify a safe exposure level for a carcinogen, only a ban on the use of asbestos can ensure complete protection against this mineral's carcinogenic effect. Therefore, emphasis should be placed on prohibiting the occupational use of asbestos in other than completely closed operations and on substituting other products whenever possible. Asbestos should be replaced, where technically feasible, by substitutes with the lower possible chronic toxicities.

The Environmental Protection Agency (EPA) has developed and is currently expanding guidelines for the safe removal of asbestos-containing ceilings, walls, etc. In addition, EPA plans to investigate the acceptability of various materials (including paints) available for sealing asbestos surfaces since the life expectancies of sealants for preventing asbestos fiber breakaway are presently unknown. Additional information regarding these studies can be obtained by contacting EPA (Office of Air Quality Planning and Standards, Emission Standards and Engineering Division, Standards Development Branch, Research Triangle Park, North Carolina 27711).

V. RECOMMENDATIONS

In view of the above information, the following recommendations are submitted to management to alleviate potential hazards and to provide a more desirable working environment for all personnel:

A. Asbestos should be replaced, where technically feasible, by substitutes with the lower possible chronic toxicities.

B. As an immediate problem does not exist but exposed asbestos is present in the insulating material, plans should be made to replace or seal surfaces as part of regular building maintenance. In the interim, periodic inspection of unsealed surfaces should be conducted to assure the integrity of the asbestos-containing insulation.

C. During removal of asbestos materials or maintenance operations which may generate airborne asbestos, stringent precautions should be taken to prevent exposures to workers and the public. In this regard, all regulations[5,6,7] promulgated by both the Occupational Safety and Health Administration and the Environmental Protection Agency should be strictly followed.

D. Air sampling to measure asbestos levels need not be performed on a regular basis. On occasion, however, this may be indicated as the extent and immediacy of a problem needs to be determined for appropriate timing of repairs or when sampling is done before, during and after sealing or removal of asbestos-containing surfaces to establish the efficacy of the techniques being used to minimize exposure to asbestos. Please refer to Appendix A "Public Health Recommendations Regarding Asbestos - Spray Building Materials" for additional background information on asbestos.

VI. REFERENCES

1. NIOSH Manual of Analytical Methods, HEW Publication No. 75-121, P & CAM. 239

2. Criteria for a Recommended Standard...Occupational Exposure to Asbestos, DHEW (NIOSH) Publication No. HSM 72-10267; 1972.

3. NIOSH Revised Recommended Asbestos Standard, DHEW (NIOSH) Publication No. 77-169; December 1976.

4. Seidman, H., Lilis, R., Selikoff, I., "Short Term Asbestos Exposures and Delayed Cancer Risk", 3rd International Symposium on Detection and Prevention of Cancer, New York, NY; May 1, 1976.

5. Asbestos, in 29 CFR 1910.1001, pp 510-14, 1976.

6. Environmental Protection Agency: National Emission Standards for Hazardous Air Pollutants. Federal Register 38:8820-8850, 1973.

7. Environmental Protection Agency: National Emission Standards for Hazardous Air Pollutants. Federal Register 40:48292-48311, 1975.

VII. AUTHORSHIPS AND ACKNOWLEDGEMENTS

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TABLE I

GENERAL AREA (GA) AND PERSONAL (P) AIR SAMPLE RESULTS FOR ASBESTOS OBTAINED ON AUGUST 16, 1977, AT THE RAMP SERVICE AREA OF TERMINAL B; TRANS WORLD AIRLINES, INC.; KANSAS CITY INTERNATIONAL AIRPORT; KANSAS CITY, MISSOURI HHE 77-102

JOB OR LOCATION	SAMPLE NUMBER	TIME	ASBESTOS fibers/cc*
Plumber A - Tunnel Area	P-7	9:06-12:37	< 0.05
Plumber A - Tunnel Area	P-16	12:37--2:37	< 0.05
Plumber B - Tunnel Area	P-1	9:08-12:38	< 0.05
Plumber B - Tunnel Area	P-18	12:38--2:37	< 0.05
Maintenance Mechanic C (Garage)	P-6	9:11--2:53	< 0.05
HV-TWI Power Box (Garage)	GA-2	9:15--4:29	< 0.05
Eating Area (Garage)	GA-8	9:20--4:29	< 0.05
Ramp Service Operator D (Baggage Room #2)	P-3	9:25--2:43	< 0.05
Main Area by Lunch Room Door (Baggage Room #2)	GA-4	9:28--2:43	< 0.05
Center of Room over Conveyor (Baggage Room #2)	GA-12	9:43--2:43	< 0.05
Lead Mechanic E (Garage)	P-28	3:15--8:59	< 0.05
Vehicle Repair Area (Garage)	GA-30	3:23--9:00	< 0.05
Exhaust Duct (Garage)	GA-26	3:29--9:47	< 0.05
Janitor F (All areas of Terminal B)	P-14	3:55--9:04	< 0.05
Lead Ramp Serviceman G (Baggage Room #2)	P-25	4:06--8:35	< 0.05
Ramp Serviceman H (Baggage Rm #2)	P-31	4:08--8:55	< 0.05
Ramp Serviceman I (Baggage Rm #2)	P-27	4:10--8:42	< 0.05
Outside Ambient Air (Background Air)	GA-10	5:50--8:57	< 0.05

* Denotes asbestos fibers greater than 5.0 microns in length per cubic centimeter of air. NIOSH Revised Recommended Asbestos Standard is 0.1 fibers per cubic centimeter greater than 5.0 microns in length on an eight-hour time-weighted basis and 0.5 ceiling limit based on a 15 minute sampling period.

APPENDIX A

PUBLIC HEALTH RECOMMENDATIONS REGARDING

ASBESTOS-SPRAY BUILDING MATERIALS

Bureau of Epidemiology and the National
Institute for Occupational Safety and Health
Center for Disease Control
May 9, 1977

INTRODUCTION

A recently publicized asbestos hazard in a New Jersey public school system has again focused attention on the potential long-range public health problems related to use of asbestos-spray building materials. Primarily during the 1950's and 1960's, asbestos was sprayed onto ceilings in some New Jersey schools. In December 1976, six schools in one township were found to have asbestos-containing material flaking from ceilings, requiring replacement of the involved ceilings.

Following these events in New Jersey, the Center for Disease Control (CDC) received inquiries from health departments in other states regarding health implications of asbestos in building materials and methods for handling such problems. The present document has been developed to help answer such inquiries.

Conditions like those encountered in New Jersey are known to exist throughout the United States and are not uncommon in schools and other buildings. The public health hazard of such conditions is directly related to the degree to which asbestos fibers may flake off ceilings and other surfaces. Factors which contribute to such flaking include age of the building, degree of structural deterioration or disrepair, and physical nature of the asbestos material (thickness, type of asbestos, per cent asbestos, etc.). Physical accessibility is also important, particularly in schools where children may scrape off chunks of asbestos.

ASBESTOS-RELATED DISEASE

Exposure to asbestos has been associated with a number of diseases including pulmonary fibrosis, asbestosis, lung cancer, mesothelioma, and gastrointestinal cancer (1). Most epidemiologic studies relating these diseases to asbestos exposure have been conducted among workers in occupational settings where exposures are much more severe than normally encountered in ambient air. Asbestos-related diseases, however, especially mesothelioma, have been observed among persons with only transient or brief exposures. Smoking is known to act in a synergistic manner with asbestos exposure in the production of lung cancer, although no such association has been shown for mesothelioma or for gastrointestinal cancer. In view of the carcinogenic hazards associated with asbestos, and since there is no known safe level of asbestos exposure, any unnecessary exposure should be avoided.

PRESENT STANDARDS

The current Occupational Safety and Health Administration (OSHA, Department of Labor) standard for asbestos in air is 2 fibers > 5 μm in length per cm^3 (8-hour time-weighted average)(2). In December 1976 the National Institute for Occupational Safety and Health (NIOSH,CDC) issued a recommendation to OSHA that this occupational standard be lowered to 0.1 fibers > 5 μm per cm^3 (8-hour time-weighted average), the lowest concentration of asbestos in air that can be reliably detected using sampling and analysis techniques (phase contrast microscopy) currently available for routine workplace monitoring(3).

In 1973 the Environmental Protection Agency (EPA) prohibited the application of asbestos-spray materials (> 1% asbestos) in buildings for fireproofing, acoustical, or insulation purposes (4,5). It has also been shown that certain decorative spray materials used on ceilings may contain appreciable quantities of asbestos; although not yet specifically prohibited, these materials should essentially be considered equivalent to other asbestos sprays. EPA has proposed amendments to their asbestos standard which would prohibit the use of all such spray-on materials, including paints, decorative sprays, and weather-proofing, if they contain more than 1% asbestos by weight. It is undecided at present whether EPA has the legal jurisdiction to establish an environmental standard to apply within buildings where asbestos-spray ceiling materials were installed prior to 1973.

EPA has developed and is currently expanding guidelines for the safe removal of asbestos-containing ceilings, walls, etc. In addition, EPA plans to investigate the acceptability of various materials, including paints, available for sealing asbestos surfaces, since the life expectancies of sealants for preventing asbestos fiber breakaway are presently unknown. Additional information regarding these studies can be obtained by contacting EPA (Office of Air Quality Planning and Standards; Emission Standards and Engineering Division, Standards Development Branch, Research Triangle Park, North Carolina 27711).

RECOMMENDATIONS

Health screening measures such as chest x-rays or pulmonary function tests are not recommended for populations with low-level exposure, for example, school children exposed to asbestos ceilings at school. To detect any of the known effects of asbestos exposure, such screening would need to be a long-term public health effort covering large numbers of people. This would be a disproportionately major undertaking in a situation where individual risk appears to be small, where increased risk of cancer may take 30 or more years to develop, and where chest x-rays and lung function tests have little proven value in early detection of lung cancer. Mass screening may be appropriate only in situations involving extremely high and sustained levels of asbestos exposure.

Public health attention, therefore, should focus on preventive action. Buildings in which asbestos has been sprayed (and this is certainly not limited to schools) should be identified. Those buildings in which asbestos is not sealed, and especially buildings in an obvious state of disrepair, should be assumed to represent a potential asbestos hazard. Preventive action should, therefore, involve sealing or removing asbestos surfaces, protecting workers engaged in sealing or removing asbestos materials, and cautioning people against smoking, especially persons with pre-existing pulmonary problems. The following specific steps, therefore, are recommended when asbestos exposure is suspected in buildings:

1) The presence of asbestos should first be documented. Often this can be done by merely reviewing building records to identify construction materials

used. If records are missing or incomplete, a microscopic identification technique (dispersion staining) can be used. If questions remain, further analyses can be performed by electron microscopy;

2) If the presence of asbestos poses an immediate hazard, as with obviously damaged or deteriorating ceilings, such surfaces should be sealed or removed without delay;

3) If an immediate problem does not exist but exposed asbestos is present, plans should be made to replace or seal surfaces as part of regular building maintenance. In the interim, periodic inspection of unsealed surfaces should be conducted;

4) During removal of asbestos materials, strigent precautions should be taken to prevent exposures to workers and the public. In this regard, all regulations promulgated by both OSHA and EPA should be strictly followed (2,4,5);

5) Air sampling to measure asbestos levels need <u>not</u> be performed on a regular basis. On occasion, however, this may be indicated, as when the extent and immediacy of a problem need to be determined for appropriate timing of repairs, or when sampling is done before and after sealing or removal of asbestos-containing surfaces to establish the efficacy of the techniques being used. If air sampling is performed, 37-millimeter Millipore type AA filter should be used, mounted in an open-faced filter holder. A high flow rate pump (10 liters per minute) should be used to draw air through the filter. Collecting air samples in this manner should detect air levels as low as 5,000 to 10,000 fibers per cubic meter of air, which is 10 to 20 times lower than the level currently recommended by NIOSH for occupational exposures. In one study of building air intakes in an urban area, mean concentrations of asbestos were 6,000 fibers per cubic meter.

Where heavy asbestos contamination has been found, air samples have ranged as high as 2,600,000 fibers per cubic meter. Therefore, the sampling technique described above should allow for identification of potentially hazardous situations, i.e., air samples showing concentrations in excess of natural background levels, or approximately 10,000 fibers per cubic meter of air (> 5 µm in length).

Further details regarding identification, sampling, and analytic techniques described above may be obtained from the Division of Prevention in each Public Health Service Regional Office. Information regarding available laboratories with proficiency in conducting asbestos analyses are also available from this source. If air samples are collected, please forward a copy of the results to the Public Health Service Regional Office so that additional information on this general problem can be developed.

REFERENCES

1. Parker WR. Occupational Lung Disorders. Butterworth, London, 1974, pp. 270-357.
2. Asbestos, in 29 CFR 1910.1001, pp 510-14, 1976
3. National Institute for Occupational Safety and Health: Reexamination and Update of Information on the Health Effects of Occupational Exposure to Asbestos. Rockville, Md., U.S. Department of Health, Education, and Welfare, Public Health Service, Center for Disease Control, NIOSH, to be published in July 1977.
4. Environmental Protection Agency: National Emission Standards for Hazardous Air Pollutants. Federal Register 38:8820-8850, 1973.
5. Environmental Protection Agency: National Emission Standards for Hazardous Air Pollutants. Federal Register 40:48292-48311, 1975.