



Inter Office

Personnel and Organization Staff

March 4, 1982

Mr. R. T. Benware, Operations Director
Ford Aerospace and Communications Corporation
Johnson Space Center

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R. B. Johnson	

Subject: Industrial Hygiene Survey - Asbestos, Lead, and Noise -
Ford Aerospace and Communications Corporation

As requested by Mr. Frank Meeks, Manager, Safety and Security Department, on January 14 and 15, 1982, the Industrial Hygiene Services Section conducted an asbestos exposure evaluation of Ford Aerospace employees working in various areas of NASA Building 30 at the Johnson Space Center. Purpose of this study was to quantify these exposures based on concerns expressed by Ford Aerospace management that the supporting steel work in Building 30 is coated with asbestos-containing insulating material. Additionally, lead and noise exposure evaluations were made at Ford Aerospace Building 1 and Ford Aerospace Manufacturing Building.

Representative sampling of the work atmosphere was conducted throughout various areas in NASA Building 30, Ford Aerospace Building 1 print shop and the work shop and lead soldering operations of the Manufacturing Building. Monitoring was of sufficient duration to accurately reflect actual daily employee inhalation exposures.

Results, as shown on the attachments, indicate that contaminant levels in Ford Aerospace buildings as well as NASA Building 30 are well within permissible occupational exposure limits (PEL). Average sound pressure levels to which employees are exposed in Building 1 and the Manufacturing Building are below 85 dBA, the level at which a comprehensive hearing conservation program is required. Lead exposures in the soldering operations were below detection limits of the analytical method. Based on these results no significant health hazard is expected from lead exposure at this location. Airborne asbestos levels throughout NASA Building 30 were found to be below the occupational PEL and are in the range expected in facilities that have been asbestos coated. Based on these results no significant risk of asbestosis exists, however, the risk of mesothelioma, lung and/or digestive tract cancer can not be predicted or discounted at this time.

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In summary, contaminant concentrations throughout the operations evaluated were found to be within permissible occupational exposure levels. Based on these results no significant health risk is expected at this time. However, since the carcinogenic threshold for asbestos has not been determined, (some investigators feel there is a zero threshold) a safe level for employees can not be established at this time.

Additional details and specific recommendations are contained in the attached discussion.

If you have any questions, please call me at (313)337-8955.

Sarunas S. Mingela

Sarunas S. Mingela
Senior Industrial Hygienist
Industrial Hygiene and Toxicology Dept.
Employee Health Services

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attachment

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DISCUSSION

Background - Asbestos

Ford Aerospace and Communications Corporation expressed concern to NASA regarding potential asbestos exposures to their employees in Building 30 in September, 1981. This was based on observations of workmen removing insulation debris from building steelwork in bags labeled "Asbestos". Following limited success with NASA environmental health services, Mr. Frank Meeks requested the assistance of Ford Motor Company Industrial Hygiene and Toxicology Department.

Prior to 1973 the steelwork of many buildings (schools, offices, hospitals, etc.) was protected from possible fire damage by spray coating with asbestos-containing insulating materials. Asbestos content of this material was variable and usually ranged from 0 to 30%. Analysis of three samples of insulating material from Building 30 found that it contained from less than 1% to 8% asbestos. Samples from other areas of the building may contain higher asbestos content.

Asbestos from building insulation can and often does contaminate the occupied portion of the building. This can occur in several ways: normal deterioration of the binder contained in the insulating material; since the material is usually easily friable, any contact with it may produce varying amounts of dust and release fibers to the atmosphere; building vibration on air movement over the material may dislodge the loosely held fibers which then become part of the dust fallout. Heating and ventilating systems can pick up the dust and distribute it throughout the building, even to remote areas that have no asbestos insulating materials.

To properly evaluate the hazard from asbestos, atmospheric fiber counts of the questionable area as well as chemical analysis of the insulating material is required.

Atmospheric Monitoring and Physical-Chemical Analysis

On January 14, 1982, general area air samples were collected from selected areas throughout NASA Building 30. Sites selected included normal work areas, as well as locations above the false ceiling. Samples were collected and analyzed utilizing procedures specified by the Occupational Safety and Health Administration (OSHA).

Air samples were collected on 37 mm diameter, 0.8 micrometer pore size, opened face cellulose acetate membrane filters contained in plastic cassettes. An air flow rate of two liters per minute was used. Filters were analyzed utilizing phase contrast microscopy in the Company Industrial Hygiene Laboratory. The fiber count method, counts all fibrous material that has an aspect ratio of at least 3:1 and are at least five micrometers in length. It must be emphasized that the phase contrast fiber count method does not differentiate between various fiber types but only identifies fibrous materials.

Chemical analysis of the parent material (bulk insulating material) was done both chemically and physically. A chemical screening test identifies those samples that can not be asbestos. Physical analysis, by X-ray diffraction and samples that are positive on the screening test, identifies both type and percent composition of asbestos.

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As shown on the attached data sheet, atmospheric samples as well as bulk samples collected from NASA Building 30 were positive for both fiber count and asbestos content. Fiber levels were found to be below the Occupational Safety and Health Administration's (OSHA) permissible occupational exposure level of two fibers per cubic centimeter of breathing air (2 f/cc).

Toxicology - Asbestos

Excessive asbestos exposure can cause asbestosis, cancer of the lungs and digestive tract, and mesothelioma.

Asbestosis is a lung disorder characterized by diffuse fibrosis of the lung tissue. The onset of asbestosis normally depends upon the asbestos dust concentration, fiber morphology, and length of exposure. It is a progressive disease which may develop fully in seven to nine years and may cause death as early as thirteen years after the first exposure. Once established, the disease can progress even after the exposures have ceased.

Mesothelioma is a cancer of the lining of cells that cover the lungs, heart and digestive tract. Eighty percent of the mesothelioma cases studied in South Africa and Great Britain were shown to have had an occupational or para-occupational association with asbestos fibers. Experience in the United States is not expected to vary considerably. Death from mesothelioma usually results within one year of diagnosis.

The permissible exposure level for asbestos is based on medical evidence obtained from studies conducted by the U.S. Public Health Service. This 2 f/cc level is expected to protect against asbestosis and to substantially reduce risk of development of neoplasms.

Lead and Arsenic Fume and Noise Evaluations

Breathing zone air sampling was conducted on representative employees in the manufacturing facility. Sampling was of sufficient duration to reflect typical operations. Results, as shown on the attachments, indicate non-detectable levels of both lead and arsenic.

Sound pressure levels measured in the work shop of the manufacturing building and the print shop of Building 1 were estimated to be below the 8-hour time weighted average (TWAE) of 85 dBA. Instantaneous measurements may be higher at times, but when exposures are averaged over an 8-hour period they would be below 85 dBA. 85 dBA is the average sound pressure level at which a comprehensive hearing conservation program must to be instituted.

Conclusions and Recommendations

Asbestos

Asbestos can be a serious health hazard to man. The OSHA permissible exposure level has been set to prevent the incidence of asbestosis and to reduce risk of development of cancers. Information is insufficient, at this time, to establish exposure standards which could assure the prevention of neoplasms in all workers, although some investigators have suggested a zero fiber in air threshold.

In view of the serious potential implications of asbestos exposure, the following control measures are recommended:

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- Clean the false ceiling area of accumulations of insulation material that has been removed, fallen or dislodged in any other way from building structures. Adhere to pertinent OSHA regulations for wet methods, protective equipment, disposal procedures, and ventilation.
- Inform all affected employees that the building is asbestos coated and of the associated risk from work in this environment. Additionally, employees should be informed of the steps being taken by management to control or reduce dust fallout.
- Provide training to maintenance personnel in the proper methods, procedures and protective equipment to wear during the handling of asbestos materials. (The Industrial Hygiene Services Section has a slide type presentation of this type of training.)
- Despite the low levels of exposure during the "P" tube operation, employees who enter the false ceiling area to remove insulation or coverings must be provided with approved respiratory protection and with special clothing. This type of protection is required by OSHA when levels at any time are equal to or exceed 10 f/cc. I.R. Bulletin No. 15 is attached to assist you in selecting proper respiratory protection.

To reduce actual employee exposures:

- Install air handling ductwork with existing asbestos-coated air supply plenum to reduce transport of friable material from the false ceiling area. Currently, ventilation is provided with air that passes directly over the dry and friable asbestos-laden insulation.
- Alternatively, the asbestos insulation could be physically removed and an asbestos free material applied.
- The asbestos insulation could be effectively sealed out by physically enclosing it with plywood or some other building material, or it could be "top coated" with an encapsulating material similar to the attached literature from KRC Corporation.

Lead and Noise

Based on the initial monitoring conducted in the manufacturing building, additional or periodic lead exposure determinations are not required. Levels are not expected to exceed 30 ug/m³ - the level at which many sections of the OSHA Lead Standard become mandatory. However, the applicable sections of CFR 1910.1025 regarding training of employees who work with lead must be complied with.

Time weighted sound pressure levels were estimated to be well below 85 dBA. These estimates are based on sound pressure level (see attached data) measurements and an estimate of daily exposure time at that level. Based on these estimates no additional acoustical engineering controls need to be instituted. Monitoring should be conducted whenever there is a change in equipment or process that could change the employee's exposure to noise.

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INDUSTRIAL HYGIENE SERVICES SECTION
INDUSTRIAL HYGIENE AND TOXICOLOGY DEPARTMENT
EMPLOYEE HEALTH SERVICES

Ford Aerospace and Communications Corporation
NASA - Building 30 Johnson Space Center

January 14, 1982

PERMISSIBLE OCCUPATIONAL EXPOSURE LIMITS TO CHEMICAL AND PHYSICAL CONTAMINANTS:

<u>Contaminant</u>	<u>8-Hour Time Weighted Average Exposure Limit</u>
Asbestos	2 fibers/cc air
Asbestos fiber medical monitoring action level	0.1 fiber/cc
Noise	90 dBA

RESULTS

<u>Location</u>	<u>Asbestos Fiber Concentration</u>
Room 127A (H-15)	0.005 f/cc
Mezzanine Area (K-10)	0.002 f/cc
Room 327 (K-14)	0.02 f/cc
Room 314 (E-11)	0.01 f/cc
Room 225 (L-15)	0.01 f/cc
Group Display - Plenum Room 330 (G-13)	0.005 f/cc
Group Display - Plenum Room 230 (G-13)	0.009 f/cc
Room 130	0.01 f/cc
Room 118 (K-14)	0.04 f/cc*
Room 116A (G-12)	0.008 f/cc
Room 112 (K-13)	0.01 f/cc
B. R. Johnson, S.S.# 459-68-7051 while removing sleeve from P-tube (14 minutes)	0.4 f/cc

<u>Location</u>	<u>Sound Pressure Level</u>
Room 225 between Columns L-14 to 16 and M-14 to 16 at console	74 dBA
Room 225 General Areas	67 - 74 dBA

BULK ASBESTOS ANALYSIS

Room 330 - Group Display Area Plenum	3% Chrysotile
Room 230 - Group Display Area Plenum	8% Chrysotile
P-Tube Repair Job	less than 1% all form of asbestos

DATA RETRIEVAL NUMBERS: SSM-1251 to SSM-1262

EQUIPMENT AND INSTRUMENTS: DuPont P-4000 and Bendix BDx-51 personal air sampling pumps with 0.8 μ m membrane filters in plastic cassettes. General Radio Type II Sound Level Meter. FORD MOTOR CO.

ANALYSIS: Ford Motor Company Industrial Hygiene Laboratory by L. Latona, Senior Industrial Hygienist utilizing phase contrast microscopy. American Industrial Hygiene Association

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INDUSTRIAL HYGIENE SERVICES SECTION
INDUSTRIAL HYGIENE AND TOXICOLOGY DEPARTMENT
EMPLOYEE HEALTH SERVICES

Ford Aerospace and Communications Corporation
Manufacturing Building

January 15, 1982

PERMISSIBLE OCCUPATIONAL EXPOSURE LIMITS TO CHEMICAL AND PHYSICAL CONTAMINANTS

<u>Contaminant</u>	<u>8-Hour Time Weighted Average Exposure Limit</u>
Inorganic Lead (Pb)	50 mcg/m ³
Arsenic (As)	10 mcg/m ³
Noise	90 dBA

RESULTS

	<u>S.S. Number</u>	<u>Classification</u>	<u>Pb</u>	<u>As</u>
Richards, Francis	467-92-9247	Assembler	N.D.*	N.D.*
Goffney, S. F.	453-31-4694	Assembler	N.D.*	N.D.*

<u>Work Shop Operation</u>	<u>Sound Pressure Level</u>
Belt Sander	82 dBA
Press Brake	75 - 78 dBA
Punch	75 - 85 dBA
Hack Saw	82 dBA
Milling Machine with air hose on	87 dBA
Paint Booth	87 dBA
General Area of Work Shop	72 dBA

DATA RETRIEVAL NUMBERS: SSM-1263 and SSM-1264

EQUIPMENT AND INSTRUMENTS: DuPont P-4000 personal air sampling pumps with 0.8 um membrane filters in plastic cassettes; General Radio Type II Sound Level Meter.

ANALYSIS: Ford Motor Company Industrial Hygiene Laboratory by T. F. Strow, Industrial Hygiene Chemist utilizing plasma emission spectroscopy.

FORD MOTOR COMPANY
Industrial Hygiene & Toxicology Laboratory
Accredited & Certified By:
American Industrial Hygiene Association

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INDUSTRIAL HYGIENE SERVICES SECTION
INDUSTRIAL HYGIENE AND TOXICOLOGY DEPARTMENT
EMPLOYEE HEALTH SERVICES

Ford Aerospace and Communications Corporation
Building 1

January 15, 1982

PERMISSIBLE OCCUPATIONAL EXPOSURE LIMITS TO NOISE

8-Hour Time Weighted Average ----- 90 dBA

RESULTS

Print Shop

<u>Location</u>	<u>Sound Pressure Level</u>
West Press Area	79 dBA
East Press Area	82 dBA
Center of Press Room	79 dBA

EQUIPMENT AND INSTRUMENTS: General Radio Type 2 Sound Level Meter.

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"Before" untreated deteriorating Asbestos Substrate
 "After" an encapsulated Hydroban 500E treated substrate

ASBESTOS FALL OUT CONTAINED!

High resolution Electronic Scanning Photo Micrographs show a falling deteriorated Asbestos Substrate, in contrast to a falling surface after a Hydroban 500E Encapsulating Treatment.

Unique non polluting safe waterbase Polymer development effectively restructures loose, friable Asbestos dust and fibers in depth, to safely bind and prevent dangerous Asbestos Fibers from becoming airborne.

A viable alternative to hazardous, and costly efforts of existing physical Asbestos removals. Polygard 500E Treatments do not endanger personnel and environment, thus contingent liabilities are avoided. No need to evacuate entire facility during the treatment process.

All Federal, State Safety and Health regulatory requirements followed strictly. Polygard 500E Asbestos Treatments are guaranteed to effect and maintain minimum clean air standards related to Asbestos Contamination.



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