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DEPARTMENT: DIG Chemical Biology Research

ACCOUNT NO: 377

PROBLEM NUMBER: 9080003

TITLE: ASBESTOS EXPOSURES DURING MAINTENANCE, DEMOLITION AND TRANSITE FABRICATION, 500, 580, X199, 349, X376, 150 and 596 BUILDINGS

CRI NUMBER

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DESCRIPTIVE SUMMARY WITH CONCLUSIONS: (Include in this space references to data books, and to earlier related reports, patents and publications.)

Air samples to determine asbestos exposures were taken during various construction and demolition operations. The outdoor demolition work and indoor pipe stripping work at X199, X376 and 349 Building showed the lowest asbestos counts of the three areas sampled. The maintenance work at 500 and 580 Buildings approached the maximum allowable concentration. Transite fabrication at 596 and 150 Buildings approached and exceeded the maximum allowable concentration of 10 fibers per milliter (fibers/ml).

Anyone working in the immediate vicinity of such jobs should use approved respiratory protection.

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DOW-2930

PROBLEM

The Industrial Hygiene Section of DIG Chemical Biology Research was asked to evaluate asbestos exposures during maintenance, demolition and transite fabrication at various buildings in the Midland Division.

CONCLUSIONS

1. Exposure to asbestos fibers was greatest during transite fabrication. Levels recorded at 596 and 150 Buildings approached and exceeded the maximum allowable concentration of 10 fibers/ml.

2. Exposure to asbestos fibers approached the maximum allowable concentration at 500 and 580 Buildings during the removal of insulation from boilers and crackers.

3. Asbestos exposures were minimal while removing covering from pipes at X199, X376 and 349 Buildings.

4. Wetting down and careful handling while removing asbestos insulation reduces airborne asbestos fiber concentrations (See Table 1 and 2).

RECOMMENDATIONS

1. The use of procedures & equipment required by Occupational Safety and Health Act and Environmental Protection Agency regulations such as signs, roped off areas, dust tight bags and approved respirators should be continued.

2. No friable asbestos debris should be dropped or thrown to the ground or to any floor below for any building or structure 50 feet or greater in height. This debris should be transported to the ground via dust tight chutes or containers. (See Federal Register, Volume 38, Number 66, 61.22 - EPA Emmision Standards).

3. When removing asbestos in an outdoor environment the section to be removed should be kept wet until final disposal has been accomplished.

4. Workers working down wind from an asbestos stripping operation should be advised to wear respiratory protection until air samples are taken to prove otherwise.

5. Sawing equipment used in fabricating transite should be equipped with dust control devices. A wet cutting blade, local exhaust for the cutting area or a combination of the

above two methods should be considered as possible engineering control methods. Air sampling will be required to assure satisfactory control of asbestos fibers.

6. A possible reduction in the speed of the cutting blades when fabricating transite should also be considered as a viable method in the reduction of airborne dust.

DISCUSSION

As per Federal Register, Volume 37, Number 202, paragraph 1910.93a, every employer shall monitor the air breathed by workmen who might be exposed to asbestos to assure that the concentration of asbestos fibers is within accepted limits. The areas monitored thus far include demolition of buildings, removal of asbestos insulation from pipes, boilers and crackers (maintenance purposes) and transite fabrications.

1. Demolition Operations - Asbestos was used extensively in old buildings as an insulating material for tanks and pipes. Asbestos is a fibrous material and tends to become airborne when buildings are demolished. Therefore, monitoring for asbestos at X199 and X376 Buildings was done in May of 1973, by the Industrial Hygiene Section of DIG Chemical Biology

Research. Breathing zone samples and area samples were obtained. These readings ranged from 0.11 to 0.48 fibers/ml. (See Table 3) The ground was damp and equipment ranging from small bulldozers to large cranes was being used. Small pieces of flaky asbestos particles were seen on the ground and entangled in parts of the steel structures. A transite sample was obtained for analysis to determine the percent asbestos and related elements (See Table 4). None of the precuationary measures required by regulation was in evidence at the time of sampling.

Removing asbestos insulation from pipes can present high exposure possibilities. At 349 Building, breathing zone samples were taken while removing insulation, the results ranged from 0.3 to 2.3 fibers/ml. The men at this operation were handling the asbestos carefully. They were using dust tight bags to contain the insulation as it was removed. Pipes had been wet down earlier that morning.. The results indicate that a workers exposure can be controlled. The majority of respirators worn were not Dow or U. S. Bureau of Mines approved and further education of the contractors is needed.

2. Maintenance Operations - Here, as above, removing asbestos insulation was the primary concern. At 500 Building asbestos was being removed from a boiler. It was an indoor job with a

strong wind coming from the east entrance and blowing northerly. No signs or ropes were in evidence. Disposable respirators were worn but were not the type recommended. Recommended types of respirators and filters to be used while working with asbestos are: Mine Safety Appliance Ultra Filter respirator with Cartridge "H"; American Optical with respirator "3M 2304" with R57 cartridge; 3M Brand, No. 871C respirator, disposable. Disposal of asbestos was improper - no dust tight bags were used at all. Asbestos removal was done in two different ways. First, the asbestos was shoveled into a wheel barrow and emptied into an open dumpster. Second, the asbestos was shoveled into the running water used to carry fly ash, etc., into holding areas. See Table 5 for results of 500 Building sampling.

At 580 Building, "L" cracker, an outdoor asbestos stripping operation was going on. A strong wind was blowing northwesterly toward other maintenance workers not envolved in asbestos removal. Precautionary measures taken included all but the wetting down process. Samples were taken prior to and after the work area was wet down (See Table 1). The operator was told that he should wear his respirator whenever working in this area and that samples would be taken. The results ranged from 1.5 to 9.1 fibers/ml.

3. Transite Fabrication - Transite is a heat resistant substance used at Dow for reactor enclosures, etc. This fabricating substance is known to contain about 30 to 40% chrysotile, one of six different types of asbestos (See Table 4 and AL#060798).

Prior to the installation of transite the material must be cut to proper size. Sawing transite creates a very dusty situation not only for those doing the cutting but for others working in the immediate area.

Samples were obtained at 596 and 150 Buildings. At 150 Building results ranged from 32 to 42 fibers/ml. The work done here was in a partially enclosed area. At 596 Building sample results ranged from 0.1 to 11.1 fibers/ml of air sampled. The samples taken here were primarily outdoors and brisk winds tended to disperse the dust. (Tables 6 and 7)

SAMPLING AND ANALYSIS

Breathing zone and general area air samples were collected by two different methods:

1. For breathing zone samples personnel sampling pumps with millipore filter cassettes (0.8 micron pore size) were used at sample rates of about 2 liters per minute.

2. General area air samples were obtained by using personnel pumps and gast pumps. Filters used with the gast pumps were 47 mm in diameter and 0.8 micron pore size. Sampling rate of about 23 liters per minute was obtained by use of a No. 5 limited orifice.

Fibers on the filters were counted by standard phase contrast microscopy technique at 450 magnification by the Midland Division Microscopy Laboratory (AL#64-788, 65-073, 059824, 059837 and AA#73-271).

Bulk samples were obtained of asbestos and transite to determine content by percent composition (AL#060798, AL#060786). These results were obtained by x-ray diffraction analysis.

TABLE 1

Stripping Asbestos From "L" Cracker, 580 Building

Sample Number	Operation	Asbestos Concentration (fibers/ml)
1	Picking up loose asbestos (wet)	1.8
2	Picking up loose asbestos (wet)	1.5
3	Stripping asbestos from Cracker (not wet)	8.9
4	Stripping asbestos from Cracker (not wet)	9.1
5	Stripping asbestos from Cracker (wet)	6.2
6	Crane Area - down wind	4.8

NOTE: Sample 6 was a general area sample and sample 3 was loose dust picked up off the crane. All others are breathing zone samples.

TABLE 2

Removing Asbestos From Pipes, 349 Building

Sample Number	Operation	Asbestos Concentration (fibers/ml)
1	Removing insulation & bagging asbestos	0.7
2	Removing pipe covering	2.3
3	General area	0.2
4	Removing insulation & bagging	1.5
5	Removing insulation from pipes	0.6
6	General area	0.3

NOTE: Breathing zone samples except where indicated.

TABLE 3

Demolition of Old Buildings with Asbestos Insulation on Pipes, Reactors and Transite Walls: X199 & 376 Buildings

Sample Number	Operation	Asbestos Concentration (fibers/ml)
X376 Building		
7	Area sample	0.48
8	Outside cabe of crane	0.29
X199 Building		
9	Man operating catipillae (loading truck with debris)	0.18
10	Man operating small utility bull-dozer - pushing debris into stacks	0.12
11	Man operating crane	0.11
12	Area sample, approximately 100 feet north of building - down wind	0.13

TABLE 4

Transite Sample From X375 Building - Sent to X-ray Diffraction to Determine Asbestos Concent and Other Crystalline Materials

Substance Found	Percent
Chrysotite	30-40
Calcite ($CaCO_3$)	10-20
Vaterite ($CaCO_3$)	15-25
Quartz	15
Noncrystalline	5-15

Range of percent was confirmed by removing soluable carbonates (calcite & vaterite) and rerunning insoluable residues.

A loose dust sample was collected at 580 Building from crane - microscopic examination indicated that the dust is probably amosite, one of the six different types of asbestos present.

TABLE 5

Stripping Asbestos From #14 Boiler, 500 Building

Sample Number	Operation	Asbestos Concentration (fibers/ml)
1	Pulling asbestos block insulation from boiler	8.0
2	Pulling asbestos block insulation from boiler	6.0
3	Area sample, approximately 6 feet from work area	0.2
4	Pulling asbestos from boiler	1.3
5	Picking up loose asbestos	0.7
6	Picking up & emptying into dempsters	4.5
7	Area sample, approximately 20 feet from work area but down wind from draft	1.0
8	Area sample approximately 8 feet lateral from work area	<0.1
9	Pulling asbestos from boiler	8.9
10	Area sample approximately 6 feet from work area	0.1

TABLE 6

Fabrication of Transite, 596 Building

Sample Number	Operation	Asbestos Concentration (Fibers/ml)
1	Cutting transite with rotary saw	9.7
2	Man installing transite on platform	1.6
3	Background around doorway	0.1
4	Measuring transite board and cutting with rotary saw	11.1
5	Man installing panals, occasionally drilling screw holes	1.2
6	General area, breathing zone height, around doorway	1.3

NOTE: All samples are in the breathing zone

TABLE 7

Transite Fabrication, 150 Building

Sample Number	Operation	Asbestos Concentration (Fibers/ml)
1	Cutting transite with rotary saw	40.7
2	Man standing to immediate right of operating saw	32.0
3	Man standing to left of saw--holding board down	42.5

NOTE: All samples were taken in the breathing zone