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NBH34.21-21-3(2)

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5612

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MIDLAND,
MICHIGAN

DEPARTMENT

Chemical Biology Research

DATE

9/10/71

AUTHORS

G. H. Flores

PROBLEM NUMBER

9008001

TITLE
EVALUATION OF ASBESTOS EXPOSURES, CHLORINE CELL MAINTENANCE,
295 BUILDING

NBH34.21-21-3(2)

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REPORT NUMBER

INFORMATIVE SUMMARY WITH CONCLUSIONS

Asbestos fiber exposures were evaluated during the replacement of asbestos diaphragms on the chlorine cells. The Pulling Tank Operator's time-weighted average exposure was within acceptable levels, although his peak exposure could approach the maximum allowable concentration. Using dry asbestos, the operator should continue to wear respiratory protection while dumping bags of asbestos. If preconditioned asbestos is used respiratory protection would not be required.

REVIEWED BY

H. R. Hayle / *9-13-71*

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ISSUED TO

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PROBLEM

Asbestos fiber exposures were evaluated to determine the effectiveness of preconditioning (steaming) the asbestos to reduce dust concentrations. Preconditioning is considered as an alternative to installing a ventilation system to control asbestos exposures.

CONCLUSIONS

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1. Using dry or steamed asbestos during the Pulling Tank Operations, the Operator's time-weighted average (TWA) exposure to asbestos fibers was well below the Threshold Limit Value* of 5 fibers per milliliter of air.
 2. Using dry asbestos, the Pulling Tank Operator's peak exposure could approach the maximum acceptable concentration of 10 fibers per milliliter of air.
 3. If dry asbestos is used, the Operator should continue to wear respiratory protection while dumping asbestos bags. If steamed asbestos is used, respiratory protection would not be required.

*Threshold Limit Value (TLV) - the time-weighted average concentration to which most people can be exposed daily without adverse effect.

4. The results of this survey differ from an earlier study largely because of a recent change in the TLV. The TLV used today is more specific for asbestos fibers. The earlier TLV required a count of all particulate matter regardless of size or composition.

PROCESS

Asbestos is received at 295 Building in burlap bags which are stored under a canvas cover near the pulling tanks. As needed, the bags are hand-carried to the tank edge, slit, and dumped into the pulling tank. The Operators wear respiratory protection during the dumping process.

The asbestos is wetted with a caustic solution and a hoe is used to break up lumps and stir the asbestos into the solution. A vacuum is then used to draw the asbestos slurry into a mixing tank where the asbestos is more evenly dispersed in the caustic solution.

The slurry is returned to the pulling tank after a diaphragm cell has been positioned. A vacuum is drawn on the cell causing the asbestos to form a filter cake mat on the cell. The caustic filtrate is returned to the mixing tank.

The cell with the asbestos diaphragm is placed on a drying table and heating coils are used to evaporate the excess water.

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After drying, the asbestos remains well congealed and does not appear to present a dust problem.

The steamed asbestos was prepared by bleeding steam in the center of a stack of bags. The bags were covered with a canvas and were exposed to the steam overnight. The bags were slightly harder to handle because of the added weight of the moisture. Also, in the pulling tank, the steamed asbestos required a little more effort to break up the lumps.

SAMPLING & ANALYSIS

Fifteen minute samples were collected near the work tables (~15' from pulling tanks) during and after the time the bags were dumped. Two minute breathing zone samples were collected at the pulling tanks while the asbestos was dumped and slurried. The samples were collected on 2" diameter membrane filters, with a nominal pore size of 0-2 μ , at air sampling rates of 8.0 and 20.0 liters per minute. The asbestos fibers were counted by the Microscopy Laboratory (AL-30-236) at 500X magnification using a combined phase contrast-polarized light technique. Electron microscope scans for SiO_2 and magnesium were used to determine the characteristics of the asbestos fibers.

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PRESENTATION OF DATA

Table 1 shows the Pulling Tank Operator's time-weighted average exposure to asbestos fibers using either dry or steamed asbestos. In both cases, his exposure was well below the TLV.

Table 2 shows the average particulate concentration found in the work areas in 295 Building. The steamed asbestos, during the dumping operation, resulted in significantly lower particle concentrations.

Tables 3 and 4 give the sample analyses for the two days in which the survey was conducted. The highest concentration of 2.2 fibers per milliliter was found while dry asbestos was being dumped into the pulling tank.

The asbestos fiber counting techniques of the Midland Division, Western Division and the University of California were recently compared to estimate the variability of the method. The variation was great and if the mean values of the three techniques are used, the Midland Division counts would be low by a factor of four. Because of the electron microscope approach used by the Midland Division Microscopy Laboratory, there is reason to believe that these counts are more indicative of the actual asbestos concentrations. But until the discrepancies are resolved the multiplication factor of four will be used as a "safety buffer." On this basis, the peak asbestos concentration during the dumping

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of dry asbestos ranged from 4-9 fibers per milliliter. Tables 1-4 show actual count made by the Microscopy Laboratory and do not take into account the multiplication factor.

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Table 1. Pulling Tank Operator's Exposures to Asbestos Fibers, Chlorine Cells Maintenance
295 Building

Operation	Dry Asbestos			Steamed Asbestos		
	Time (%)	Avg. Conc. (fibers/ml)	Conc. x Time	Time (%)	Avg. Conc. (fibers/ml)	Conc. x Time
Handling asbestos bags	6.25	0.32	0.020	6.25	0.32	0.020
Dumping asbestos	6.25	1.62	0.101	6.25	0.60	0.038
Pulling tank work	75.00	0.40	0.300	75.00	0.40	0.300
Breaks (lunch, etc.)	12.50	--	0.000	12.50	--	0.000
Time-Weighted Average Exposure (fibers/ml)			0.42			0.36
Threshold Limit Value* (fibers/ml)			5.0			5.0
Maximum acceptable concentration		10.0			10.0	

*TLV (Threshold Limit Value) is the time-weighted average concentration to which most people can be exposed daily without adverse effect.

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Table 2. Average Particulate Concentrations Measured During Pulling Tank Operations,
Chlorine Cells Maintenance, 259 Building

<u>Area</u>	<u>No. of Spls</u>	<u>Total Dust Conc. (mg/m³)</u>	<u>Total Particles (>5 microns) per ml air</u>	<u>Total Fibers (>5 microns) per ml air</u>
Pulling tank - general	3	---	--	0.40
Pulling tank - dumping dry asbestos	4	10.4	21.7	1.62
Pulling tank - dumping steamed asbestos	4	15.6	3.8	0.60
Work tables - after dumping dry asbestos	5	2.2	1.5	0.23
Work tables - after dumping steamed asbestos	4	3.0	0.9	0.13
Asbestos storage	2	0.7	1.3	0.32

Table 3. Samples Analysis (5-18-71), Chlorine Cells Maintenance, 295 Building

<u>Sp1 No.</u>	<u>Area</u>	<u>Air Vol. Sampled (liters)</u>	<u>Total Dust (mg/m³)</u>	<u>Asbestos Fibers (>5 microns) per ml air</u>
1	Pulling tank - background	179.5	--	0.42 ✓
2	Pulling tank - general operation	239.1	--	0.28 ✓
3	Asbestos bag storage	179.5	--	0.49 ✓
4	Pulling tank - forming diaphragm	179.5	2.8	0.31
5	Work tables (dump dry asbestos)	97.5	3.1	0.35
6	Dumping steamed asbestos	12.0	33.3	0.83
7	Work tables (dump steamed asbestos)	97.5	2.1	0.21
8	Dumping steamed asbestos	12.0	16.7	1.17
9	Work tables (dump steamed asbestos)	97.5	4.1	0.27
10	Dumping dry asbestos	12.0	16.7	1.83 ✓
11	Work tables (dump dry asbestos)	97.5	2.1	0.51

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Table 4. Sample Analysis (6-9-71), Chlorine Cells Maintenance, 295 Building

Spl No.	Area	Air Vol. Sampled (liters)	Total Dust Conc. (mg/m ³)	Asbestos Fibers (>5 microns) per ml air	Total Particles (>5 microns) per ml air
1	Dumping dry asbestos	40.0	2.5	1.05	21.8
2	Work tables (dump dry asbestos)	128.0	0.0	0.00	0.7
3	Dumping steamed asbestos	40.0	5.0	0.15	2.5
4	Work tables (dump steamed asbestos)	120.0	4.2	0.00	1.1
5	Dump steamed asbestos	40.0	7.5	0.25	5.1
6	Work tables (dump steamed asbestos)	120.0	1.7	0.02	0.6
7	Dumping dry asbestos	40.0	7.5	2.20	20.7
8	Work tables (dump dry asbestos)	120.0	0.8	0.13	1.6
9	Dumping dry asbestos	40.0	15.0	1.40	22.6
10	Work tables (dump dry asbestos)	120.0	3.3	0.08	1.0
11	Work tables (dump dry asbestos)	120.0	1.7	0.08	1.8
12	Asbestos bag storage	300.0	0.7	0.15	1.3

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