Chlorine I

THE DOW CHEMICAL COMPANY

TEXAS DIVISION
FREEPORT TEXAS 77541

ST0014434

ENVIRONMENTAL SURVEY

Addendum "A"

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SURVEY OF ASBESTOS USE IN CHLOR ALKALI PLANTS, SPECIFICALLY, CHLORINE I, CHLORINE 3, CHLORINE 5 AND CELL MANUFACTURING

PROBLEM

Industrial Medical Department of the Texas Division requested that the Environmental Health Group survey and evaluate exposures to asbestos encountered by personnel during several operations in the Chlor Alkali area specifically Chlorine I, Chlorine 3, Chlorine 5 and Cell Manufacturing.

CONCLUSIONS

After surveying the plants in the Chlor Alkali area that handle asbestos and calculating the Time Weighted Average (TWA), it can be concluded that the operators in these plants are exposed to asbestos concentrations well below the current TLV's.

RECOMMENDATIONS

1. From the standpoint of airborne asbestos contamination and the time weighted averages on exposure time it was concluded that we were well below the current TLV for asbestos.

PLAINTIFF'S EXHIBIT

DOW-2635

After surveying the areas in the Chlor-Alkali plants that handle asbestos, it is recommended that all operators in the asbestos handling areas wear approved dust respirators as a precautionary measure from any asbestos that might contaminate the atmosphere in the future.

2. Caution and care should be exercised in the handling of asbestos in the bag to limit the asbestos coming from the bag in the emptying processes. Bags should be kept covered when not in use.

3. The practice of sitting on bags of asbestos should be prohibited.

4. Good housekeeping is extremely essential in the safe handling of asbestos fibers. Any bag breakage or spillage should be cleaned up at once. Vacuum cleaning is preferred to sweeping with a broom; however, if broom sweeping is the only way, the asbestos spill should be thoroughly soaked down with water to minimize dustiness.

5. All personnel who have occassion to use asbestos should be informed of the hazard of the material and the correct procedures for handling asbestos fibers so as to prevent high dust levels.

6. The areas handling asbestos should be checked periodically, at least once every 6 months by the department handling the asbestos, to insure correct handling procedures and to get a check on the airborne asbestos in the area.

PRESENTATION OF DATA

1. The present TLV (Threshold Limit Value) for asbestos exposure according to the Federal Register, Volume 36, Number 105, dated May 29, 1971, is five (5) fibers per milliliter greater than five (5) microns in length and this is for an eight (8) hour work day exposure.

2. In the Chlorine I plant the job of the Class 2 Day Operator was studied in Building A-606. Thos operations job is performed usually by two (2) operators and is somewhat unusual in the respect that both operators in this classification perform the functions herein and these functions are only performed on an average of six (6) times per month. The operators were outfitted with MSA Rotameter pumps, filter holders and filters in order to ascertain dust concentrations of asbestos in their working operations. In working with asbestos these operators work 80 minutes per shift out of 480 minutes. This breaks down as follows; dumping dry asbestos into mixing dumpster requires 20 minutes per operation, concentration level measured in fibers per cc totaled 1.893.

The next job that was studied was transporting dry asbestos into the cell building which requires 10 minutes. Concentration level of asbestos measured here was 0.119. Next, mixing dry asbestos with water 5 minutes exposure time, concentration measured 0.612. Pulping cell with asbestos required 30 minutes, level of concentration measured on this job was 0.151.

The final job performed by these operators was that of unstopping feed line of pump. This requires 15 minutes and the concentration measured here was also 0.151.

The time weighted 8 hour average for these operators equaled 0.102 fibers per cc when job is being performed, dealing with asbestos fibers. These operations jobs lack significant potential in asbestos exposure, and the little asbestos measureable in the air was combated by the fact that operators on these jobs wear Dust-Foe 77 dust respirators.

According to the latest TLV quoted earlier in this report, it can be concluded here that exposure to asbestos in the operations jobs in Chlorine I, Building A-606 is well below the TLV.

3. In the B-622 Building at Chlorine 3, the operator that handles asbestos performs two functions in the same job, in that he dumps asbestos into the slurry tank and pulls diaphragms. The time spent in this operation totaled 420 minutes; however, this is a two man job and this time is divided by 2, indicative of one man exposure time to ascertain the TWA. The time weighted average per man in handling asbestos over an 8 hour period at Chlorine 3 was 0.263 fibers per cc, again well below the current TLV.

4. The handling of asbestos in the A-1322 building of the 1300 block at Plant A in Chlorine 5 entailed looking at several jobs. The first of which was the Towmotor Operator at Chlorine 5. This operator transports asbestos from the Hot House to the drawing vat and then moves the dumpsters of empty sacks from the vat area to outside the building. Time for these three operations performed by the Towmotor Operator totaled 38 minutes per 8 hour shift. The time weighted average exposure for an 8 hour period totaled .007 fibers per cc, below the TLV that is currently in effect.

The next job that was studied, dealing with asbestos in Chlorine 5, was that of the Cell Maintenance Operator who works in the diaphragm drawing process. This operator performs three main functions in relationship to asbestos handling and these are (1) breaking asbestos bags and dumping them into the drawing vat, (2) the diaphragm drawing operation itself, (3) epoxying heads, that is mixing asbestos with epoxy. The time weighted 8 hour average on this job totaled 0.1198 fibers per cc. Present TLV for asbestos exposure is 12 fibers per cc greater than 5 microns in length; therefore, it is concluded that the fiber count reported here is considerably less than the TLV.

5. In surveying the handling of asbestos in the Cell Manufacturing Area at A-1022, we found that three (3) operators performed the various functions on an alternating basis. The jobs that the operator in Cell Manufacturing does, relating to asbestos handling, involves dumping asbestos from the bags into the slurry tank, analyzing

the slurry tank solution which is asbestos and caustic, the slurry tank operation itself which is dipping the cathode, and raking the cathode. The TWA on an 8 hour work day exposure period in Cell Manufacturing amounted to 0.314 fibers per cc of asbestos.

A total of 62 samples were taken in the Chlor-Alkali plants over a period of 15 months, from March of '70 to June of '71. MSA Rotameter pumps with filter holders and AAWG 04700, AA 0.8 micron white grid, 47 mm Millipore filters were used in the sampling. The microscopy group of central lab did the particle count.

Counting Procedure: Microscopy Lab B-1218

Incoming Millipore filters were sectioned out in four grid square sections and immersed in a 10% solution of millipor filter in a one to one mixture of dimethylphthalate and diethyloxalate on a slide and covered with a cover slip. When the filter section becomes clear it is placed on a microscope (40x objective and 12.5x eye piece or a total of 500x field magnification). Eye piece is equipped with a micrometer of 100 divisions, each division is equal to 2.5 microns.

Counting is done by making x number of passes across grid square until an average of approximately 300 particles and fibers are counted. Only fibers greater than 2.5 micron fibers and 5-10 microns and fibers greater than 10 microns are counted.

Particle or fiber number is ascertained by multiplying the number counted by $\frac{12}{X}$ and this gives you the number per squares and this figure is multiplied by the number of squares on filter.

Ref: Millipore ADM-30, 1964 adition.

Table 1. Class II Day Operator Exposures to Asbestos Fibers, Chlorine I, A-606 Building

	Dry Asbestos	
	Time Min.	Avg. Conc. (fibers/cc)
Dumping asbestos into mixing dumpster	20.0	1.893
Transporting asbestos into cell building	10.0	0.119
Mixing asbestos with H_2O	5.0	0.612
Pulping cell with asbestos	30.0	0.151
Unstopping feed line of pump	15.0	0.151

Time-weighted Average Exposure (fibers/cc) -----0.102^{f}/cc

Threshold Limit Value* (fibers/cc) 5.0

*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. Operator Exposures to Asbestos Fibers, Chlorine III, A-622 Building
(Dumps asbestos & pulls diaphragms)

	Dry Asbestos	
	Time Min.	Avg. Conc. (fibers/cc)
Dumping asbestos & pulling cells (diaphragms) in slurry tank & proceeding through complete drawing cycle.	**420	0.263
Lunch, coffee & smoke breaks	60	

** This is a two man job and the figure for time is derived by dividing total two man time by 2.

Time-weighted Average Exposure (fibers/cc)-------0.263 f/cc

Threshold Limit Value *(fibers/cc) 5.0

*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 3. Cell Maint. Operator (Diaphragm drawing) Exposures to Asbestos Fibers, Chlorine V, A-1322 Building.

	Dry Asbestos	
	Time Min.	Avg. Conc. (fibers/cc)
Breaking bags and dumping into drawing vat	12.0	0.80
Diaphragm drawing operation	324.0	0.147
Epoxying heads (Asbestos mixed w/epoxy)	10.0	0.031

Time-weighted Average Exposure (fibers/cc)-------0.1198 f/cc

Threshold Limit Value*(fibers/cc) 5.0

* 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 3A. Towmotor Operator Exposures to Asbestos Fibers, Chlorine V, A-1322 Building

	Dry Asbestos	
	Time Min.	Avg. Conc. (fibers/cc)
Transports Asbestos from delivery point to hot house	30.00	0.084
Transports Asbestos from Hot House to drawing vat	5.00	0.084
Moving dumpsters of empty sacks from vat area to outside building	3.00	0.119

Time-weighted average Exposure (fibers/cc)--------.007 f/cc

Threshold Limit Value* (fibers/cc) 5.0

*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 4. Operator Exposures to Asbestos Fibers, Cell Mfg., A-1022 Building

	Dry Asbestos	
	Time Min.	Avg. Conc. (Fibers/cc)
* Dumping asbestos from bags into slurry tank	75	1.125
Analyzing slurry tank solution (asbestos & caustic)	75	0.677
Slurry tank operation (dipping cathode)	75	.145
Raking cathodes	100	.048
Breaks, Lunch, misc. duties & change time	155	

* Three operators perform these functions on an alternating basis.

Time-weighted Average Exposure (fibers/cc)----------0.314 f/cc

** Threshold Limit Value (fibers/cc) 5.0

TWA: $E = \frac{CaTa + CbTb + CcTc\text{-------}TaTn}{480}$

** 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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