

FILE NAME: General Motors (GM)

DATE: 1960 Mar

DOC#: GM066

DOCUMENT DESCRIPTION: Internal Report - Inland Manufacturing Division -
Dayton, OH

INDUSTRIAL SPECIAL REPORT

Inland Manufacturing Division
Dayton, Ohio

March 16, 17 and 18, 1960

F-16-



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File

Trichloroethylene
Asbestos Dust
Chromic Acid
Toluene Diisocyanate (TDI)

No. 6031

Reported by: G. C. Stoecker

00044

Industrial Hygiene

Inland Manufacturing Division
Dayton, Ohio

Several items of industrial hygiene interest were investigated at Inland Manufacturing Division on March 16, 17 and 18, 1960, at the request of Mr. S. A. Wright. The subjects were discussed with Mr. H. I. Newsome and Dr. R. L. Johnstone in addition to Mr. Wright. Mr. Wright assisted in the survey conducted by G. C. Stoecker of the Industrial Hygiene Department.

SUMMARY, CONCLUSIONS AND SUGGESTIONS

Trichloroethylene

Tests for trichloroethylene vapors were made in Department 8, Building 20, at the steering wheel finishing operation in which this material is used. The concentrations found were below the permissible limit.

Asbestos Dust.

Dust counts were made at brake lining operations in Department 16, Building 11. The count at the forming press was equal to the permissible limit. A count taken at the salvage grinding operation exceeded the permissible limit.

Suggestions for better dust control and environmental improvement are contained in Mr. K. E. Robinson's letter of January 25, 1960, to Mr. H. L. Avery. It would be advisable for the employee to wear an approved dust respirator while doing salvage grinding.

Chromic Acid

Tests were taken for chromic acid in Department 91, Building 25, near the rubber mold cleaning tanks. No chromic acid was detected.

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Toluene Diisocyanate (TDI)

Results of tests for TDI in Department 75, Building 28, were well below the permissible limit. Air analyses performed by plant chemical laboratory personnel would become a better record on the absence of harmful exposures if scheduled periodically rather than occasionally. Monitoring of this type should be considered.

DISCUSSION

Trichloroethylene

Finishing of steering wheels in Department 8, Building 20, includes immersion of the molded wheel into hot trichloroethylene vapors. The equipment is essentially a vapor degreaser of special design. The tank is cylinder shaped and the wheel is automatically immersed and rotated in the vapor phase. Five of these are located in a separate room. Exhaust slots are located in the center of the room as a unit with three tanks on the west side and two on the east side.

After the wheels are removed from the tanks they are stacked on spindle dollies. The plastic absorbs trichloroethylene during the process and vapors are slowly released from the stacked wheels.

Certain solids are absorbed from the wheels, requiring recovery of the trichloroethylene by a separate process. The recovery process consists of heating the solvent in a drum by means of a steam coil. The upper part of the drum is fitted with a water cooled condensing coil. A trough fitted around the inside of the drum beneath the coil collects the condensed vapor and the condensate is piped directly to the end tap of a metal storage drum. The recovery process was not observed in full operation but it was stated that the odor of trichloroethylene is not prominent and has never caused complaints.

Results of tests for trichloroethylene vapors under various conditions are recorded below. The concentrations detected are all below the permissible limit.

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Permissible Limit for Trichloroethylene

The permissible limit for continuous exposure to trichloroethylene is 200 parts per million of air by volume (ppm).

Results of Tests for Trichloroethylene

Test No.	Location and Condition	Trichloroethylene in ppm
1	Near stacked wheels after removal from degreasers	95-120
2	Breathing zone near degreasers on west side of exhaust system	30-50
3	Repeat of Test No. 2 while one wheel is being removed from degreaser. Maximum detected	115
4	Repeat of Test No. 2 with two spindles of finished wheels located along west wall. Exhaust draws vapors toward sampling point	20-50
5	Breathing zone near degreasers on east side of exhaust system	15
6	Repeat of Test No. 5 while one wheel is being removed from degreaser	50

Asbestos Dust

Brake lining manufacturing operations are done in Department 16 of Building 11. The dry material (asbestos, fillers and binders) is mixed at another location and transported to Department 16 where the liners are formed, baked, cut and ground to dimension.

Local exhaust at the cutters and grinders appeared to adequately control the dust at these operations. However, there is no local exhaust at the forming operation. This requires handling of the dry mix and the area is heavily coated with settled dust.

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Asbestos Dust (Cont'd)

The brake lining operations were observed by Mr. K. E. Robinson of the Industrial Hygiene Department on January 13, 1960. Specific recommendations for local ventilation and environmental improvement are contained in his letter of January 25, 1960, to Mr. H. L. Avery.

The results of dust counts on air samples taken at several locations are recorded below. The count at the forming press (Test No. 7) is equal to the permissible limit. The improvements outlined in Mr. Robinson's letter should be applied to this operation. Adequate exhaust control will not only reduce the potential health hazard but will also aid in correcting the housekeeping problem.

The dust count during scrap grinding (Test No. 11) exceeds the permissible limit. Even though this is not a continuous operation, it would be advisable for the operator to wear a U. S. Bureau of Mines approved toxic dust respirator while grinding the scrap.

Permissible Limit for Asbestos Dust

Although the brake lining material is composed of a mixture of asbestos with other ingredients, the permissible limit is considered as that of asbestos. The permissible limit for exposure to asbestos dust is 5,000,000 particles per cubic foot of air.

Results of Asbestos Dust Counts

<u>Test</u> <u>No.</u>	<u>Location and Conditions</u>	<u>Particles per</u> <u>Cubic Foot of Air</u>
7	Breathing zone at forming press 507 and bake press 508. No local exhaust. Hanging circulating fan running	5,000,000
8	Breathing zone of employee loading feed magazines of preheat ovens. Dust arises as liners are handled and stacked	2,000,000
9	Breathing zone between discharge of splitter and feed of grinder near preheat ovens	2,000,000

00048

Results of Asbestos Dust Counts (Cont'd)

Test No.	Location and Conditions	Particles per Cubic Foot of Air
10	Breathing zone at ID grinder (No. ID 28963). Grinder has local exhaust	3,000,000
11	General condition in salvage grinding room during scrap grinding	11,000,000

Chromic Acid

Chromic acid is used for cleaning rubber molds in Department 91, Building 25. The weather strip molds are multicavity aluminum, measuring 158" x 21". Cleaning is accomplished by immersion in a detergent tank, then a rinse tank followed by running water rinse before immersion in the chromic acid cleaning tank. Following chromic acid cleaning, the mold is returned to the rinse tank and given a final rinse with running water and steam.

Brulin 815 QR Detergent is used in the detergent tank and Brulin 618 acid mold cleaner is used in the acid cleaning tank. According to information obtained from Brulin and Company of Indianapolis, suppliers of these materials, the 815 QR is a mixture of polyphosphates, silicates, organic detergent, emulsifier and alkanol-amines. The solution was heated to 190° F. There is no local exhaust on the tank but direct inhalation of emitted steam and other vapors was not objectionable.

The 618 acid mold cleaner is a mixture of chromic, sulfuric and phosphoric acids in water. This solution was used at 185° F. The tank surface is approximately 25' x 18" with local exhaust slots along the top edge of the 25' dimension on both sides. Chromic acid odor was intermittently detectable directly alongside the tank.

Three employees occupy work stations at the mold conveyors weighting weatherstrips about 18' to 25' from the acid tank. Complaints of chromic acid mist had been registered by one employee working at the conveyor about 18' from the tank.

Tests for chromic acid were made at this station under normal conditions as recorded below. No chromic acid was detected.

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Permissible Limit for Chromic Acid

The permissible limit for exposure to chromic acid is 0.1 milligrams per cubic meter of air.

Results of Tests for Chromic Acid

Test No.	Location and Conditions	Milligrams of Chromic Acid per Cubic Meter of Air
12	Breathing zone at weather-strip conveyor about 18' from acid tank while mold was in tank	None Detected
13	Same location as Test No. 12 while mold was being removed from tank, rinsed and steamed	None Detected
14	Breathing zone on platform alongside acid tank. Not a regular work station.	None Detected

Toluene Diisocyanate (TDI)

Toluene diisocyanate (TDI) is used in the polyurethane foam production for crash pads and seat pads. Crash pads are processed in the building adjacent Building 25. Seat pads are produced in Building 28.

The potential hazards of TDI are well recognized and the processes are well controlled by enclosures and local exhaust at points where exposures are likely to occur. It is understood that good control is enhanced by air sampling for TDI performed by personnel of the chemistry laboratory. A record of air analyses will be of value in the event of alleged illnesses which may be attributed to TDI exposures. However, periodic scheduling of such tests, rather than an occasional survey, should be considered. Such tests should also be made when production schedules are increased or new equipment put into operation.

Tests for TDI were made at several locations in Department 75, Building 28. The tests were taken under present production

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Toluene Diisocyanate (Cont'd)

rates with only the south side of the seat cushion line in operation. The results, recorded below, are well below the permissible limit for exposure to TDI.

Permissible Limit for TDI

The permissible limit for exposure to TDI is 0.1 part per million parts of air by volume (ppm).

Results of Tests for TDI

Test No.	Location and Conditions	TDI in ppm
15	Breathing zone of foamer operator. Exhaust slots along conveyor near this location	None Detected
16	Breathing zone along conveyor in area of mold covering operation. Exhaust slots behind conveyor	None Detected
17	Breathing zone at unloading station after first pass through oven	None Detected
18	General condition in area of transfer of pads from roller squeezer to conveyor for final cure oven	None Detected
19	General condition along conveyor where cloth strips are applied to finished pads	Less than 0.01

EXPLANATORY NOTESTest Methods

Trichloroethylene vapor was determined with a Davis Halide Meter.

00051

Test Methods (Cont'd)

Air samples for asbestos dust were collected in butanol with a Midget Impinger. Counts were made according to U.S.P.H.S. Bulletin No. 217.

Chromic acid samples were collected in water with Greenburg-Smith impingers. Analyses were done by a colorimetric method.

TDI samples were collected in a solution of acetic and hydrochloric acid. Analyses were done according to the method of Marcali.