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Eighty Maiden Lane, New York, New York 10038

INDUSTRIAL HYGIENE SURVEY FRITZSHE, DODGE AND OLCOTT CLIFTON, NEW JERSEY

On May 9, 1975 an Industrial Hygiene survey was performed by the undersigned. Mr. Charles Wellenkamp and Dennis Dietrich acted as informed guides.

The survey dealt specifically with solvent exposures and centered on benzene. Personnel samples were taken onto activated charcoal with calibrated Bendix Micronair sampling pumps. Thirteen (13) area samples were taken to relate to the personnel samples. This was done with a Century Systems Organic Vapor Analyzer equipped with gas chromatograph capability.

Benzene

This aromatic hydrocarbon beside having narcotic effects has been found capable of causing liver and kidney damage. More importantly it is different from xylene and toluene in that it causes depression of the bone marrow (a red blood cell production site) resulting in anemia and perhaps leukemia.

In areas where employees may be exposed to near acceptable levels or above good practice includes complete blood count, reticulocyte count, serum bilirubin and regular urinary phenol (a metabolite of benzene in the body.) Benzene has a threshold limit value (TLV) of 10 ppm. That means that the average exposure of 8 hours time should not exceed 10 ppm. 15 minute excursions of up to 50 ppm are allowed at present. It has a low odor intensity even at 100 ppm and so has poor warning qualities by the sense of smell.

Generally, all results of personnel sampling show levels below the TLV for benzene. However, several approach it. The exposure to ethylene dichloride appeared acceptable. OVA readings relate well to the personnel samples and indicate several areas which influence the personnel ppm values. These are discussed further below.

The CONTINENTAL INSURANCE COMPANIES

-2-

Building #4

In this building, benzene is found in vats as a top layer over water. Several area samples indicated that there were leaks out of the 2 vats and levels up to 29 ppm around them. At Cubby's desk these levels would cause significant exposure if Mr. Cubby were there for 8 hrs/day. Fortunately, as table 2 test #1 indicates he moved around enough on this day to be slightly below unacceptable levels.

Another job evaluated in Building 4, that of chemical operator showed quite acceptable exposures to benzene and ethylene dichloride. This makes a point that high levels near the windows dissipated quickly and did not appear to spread significantly. The open windows probably had a large effect on this situation. This point is also supported by the fact that catwalk readings above vat 68 gave acceptable levels.

Building #7

In this small building working with a variety of organic sulfides there was a closed distillation going on with benzene involved. Area levels in the employee's main area of work were fairly low, however at the exit of the vacuum system where uncondensed benzene exited as vapor, levels were well over acceptable.

In relating the work area samples to 2 personnel samples of the same employee, he seemed to be very much tied to that area and his exposure was practically related to benzene escape levels there. Windows and doors were wide open and probably helped lessen all levels noted in this building.

Building #3

Benzene and other solvents are used to extract remaining oils. Water is extracted with benzene. Unfortunately this building was in operation during the walkthrough day but not during the survey day. The number of vessels potentially used in this building with benzene makes it an area for possible future consideration.

Other extractions using ethanol, methanol, isopropanol, were observed in other buildings. Because of their methods of use and their less toxic nature they were not evaluated in more detail.

Recommendations

Although no exposure on this visit was excessive, this was done under summer conditions and during what might be considered less production than usual. These recommendations are made with this in mind.

The CONTINENTAL INSURANCE COMPANIES

-3-

- 5/75/1 New employees likely to work in buildings where benzene is used on a regular basis should be given blood tests. These would be given and evaluated to see if the new employee is predisposed to benzene toxic effects.
- 5/75/2 Employees working in building 4, 7 and possibly 3 should be given regular urinary phenol tests to help determine high benzene exposure levels. Constant levels greater than 75 mg/liter should result in strenuous efforts to limit exposure.
- 5/75/3 Points where benzene may be released in steam as a vapor should be determined (as some here) and engineering controls used to limit its presence. Any areas where tighter piping connections can be made should be maintained. The possibility of scrubbing the vapor through charcoal and routing it outside might be considered.
- 5/75/4 Exposures to ethylene dichloride should be carefully watched. This material is a central nervous system depressing agent, a liver and kidney toxin and skin defatting agent.
- 5/75/5 Employees should be informed of symptoms of chronic benzene poisoning. These include headache, dizziness, fatigue, loss of appetite, irritability, nervousness, or nosebleed. Awareness of these signs might allow an employee to notice something which might otherwise be overlooked.
- 5/75/6 If exposure to 100 ppm or more for brief periods occur, as in spills or cleaning of tanks, an appropriate cartridge respirator should be worn. Brief exposures to high levels may result in chronic benzene intoxication.
- 5/75/7 It is suggested that a roughly similar evaluation take place in a winter condition when doors are closed and operations are on a fuller basis. This might also be done to check any improvements in engineering controls. This service can be available upon request from this office.

I hope that this work has been helpful to you. If I can be of more help in this matter, please let me know.

Very truly yours,

Joseph B. Baker
Industrial Hygienist
(212) 374-2424

JBB/mr

GIV0770

TABLE #1
ORGANIC VAPOR ANALYZER - BENZENE DETERMINATION (1)

<u>AREA SAMPLED</u>	<u>PPM BENZENE</u>
*1) Foremans desk, <u>building #4</u>	23
2) At basin, next to #61 On catwalk above vat 68	29 7.5
3) At reactor 68	15
4) At aisle near desk between 68 and 41	9,11
5) By still 47 and 39 in the aisle	4
6) <u>Building #7</u> in the middle of Mr. Mezey's work area (morning reading)	8.6
7) Same as #6 (afternoon reading)	6.8
8) Upwind of exhaust system (#27)	4.5
9) On downwind side of exhaust system	28
10) At foremen's desk, building #7	6.5

(1) This OVA has gas chromatograph capabilities. The retention time for benzene was roughly 95 seconds and was determined in offices before going into the plant. A 3 inch column (DNOP) was used.

TABLE #2
PERSONNEL SAMPLE DATA

<u>Job/Procedure Description</u>	<u>Flow rate</u>	<u>Time On-Off</u>	<u>Sample for</u>	<u>TLV</u>	<u>Sample Conc.</u>
1) <u>L. Cubby</u> , supervisor of building 4. He is in and around the area roughly 50% of his time.	.054 lpm	9:50-11:57	Benzene	10	9
2) <u>Matt Bereski</u> , chemical operator, tends vats in roughly $\frac{1}{2}$ of the floor including in Cubbys desk area.	.054	1:20- 3:15	Benzene Ethylene dichloride	10 50	2.2 29.5
3) <u>Joe Mezey</u> , chemical operator in building 4. Distillation involving organic sulfide - benzene. He is here for a good proportion of shift.	.054	9:40-11:55	Benzene	10	6
4) <u>Joe Mezey</u>	.054	1:30- 3:15	Benzene	10	7.2

This sampling was done with a calibrated Bendix Micronair pump. Charcoal tubes were attached near the collar to approximate the breathing zone.