



The Industrial Commission
Of Ohio
Division Of Safety & Hygiene
246 N. High St., Col., O. 43215

November 7, 1984

Legal Section
Industrial Commission of Ohio
246 North High Street
Columbus, Ohio 43215

Re: OD 19199-22
Richard Arrasmith
Inland Division - GM
Vandalla, Ohio

Attention: Judy Spencer

Dear Ms. Spencer:

Reference your IOC dated October 10, 1984, and that of Mr. Jerome Fatora dated September 28, 1984. I do not feel qualified to reply to the request of Mr. Fatora, i.e. submit an opinion as to whether there was a relationship between the claimant's exposure to TDI and his subsequent symptomatology—this request should be directed to a medical specialist familiar with TDI sensitization. Upon review of the O.D. file returned to me it seems such an opinion was rendered by Doctor Gerson, M.D., a specialist for the Industrial Commission of Ohio wherein on January 20, 1983, upon examination of the claimant he reported the claimant suffered from "asthmatic bronchitis as a result of exposure to TDI and was sensitized to the effect that various other fumes and odors bring on the symptoms ...injury was related to his employment."

I would like to expand upon the comments made at the hearing and relate it to the philosophy of Industrial Hygiene; in particular the OSHA permissible exposure limit (PEL) and the American Conference of Governmental Industrial Hygienist Threshold Limit Value Concept (TLV), and how it applies to this case. Specifically:

Smith and Schnacke letter dated July 11, 1983 . . .comment that "Mr. Wojdacz took air readings with the bag in place in the early afternoon, and found the TDI levels to be significantly reduced (.002 - .003 ppm range.)

"Air samples taken on October 30, 1981, by Mr. Wojdacz in the foamer head area and found levels in the .002 - .003 ppm range. This reading demonstrates levels of TDI ten times below OSHA safety requirements."

Inland Memo, dated June 17, 1983, to Dave Swafford and signed by Tim Wojdacz statement that "readings approaching .02 ppm standard . . .bag in place significantly reduced . . . in the .002 - .003 range or about 10 times less than before."

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The American Conference of Governmental Industrial Hygienist Threshold Limit Value for Toluene diisocyanate has been formally lowered to .005 ppm based on an eight hour time-weighted average with a STEL of .02 ppm. The explanation of this term is in my original report of December 14, 1982, and will not be repeated here. The OSHA permissible exposure limit (PEL) has not changed. The reason for the disparity in these levels between the two organizations is that the ACGIH reviews and updates their TLV's yearly based on "the best available information from industrial experience, from experimental human and animal studies, and, when possible, from a combination of the three." OSHA at its inception adopted the TLV concept and promulgated them into law around 1970 using the term "PEL" instead of "TLV". They have never been updated, nor were they intended to be used as "pass or fail" as OSHA uses them. Hence, it should be easily understood that the ACGIH is the most current, up-to-date, exposure recommendation. The preface to the ACGIH TLV Concept states:

Threshold Limit Values refer to airborne concentrations of substances and represent conditions under which it is believed that nearly all workers may be repeatedly exposed day after day without adverse effect. Because of wide variations in individual susceptibility, however, a small percentage of workers may experience discomfort from some substances at concentrations at or below the threshold limit, a smaller percentage may be affected more seriously by aggravation of a pre-existing condition or by development of an occupational illness. The TLV-TWA should be used as guides in the control of health hazards and should not be used as fine lines between safe and dangerous concentrations.

Review of the ACGIH Documentation of TLV's⁽¹⁾ reveals the following rationale regarding the lowering of the TLV value for Toluene diisocyanate. It states:

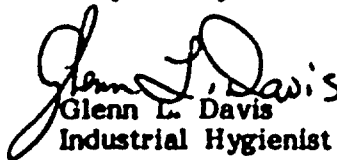
"The previous TLV of 0.02 ppm, which has been unchanged for over 15 years, appears to have been a compromise between the findings of Homa, on the one hand, and Elkins et al,⁽¹²⁾ on the other. More recent studies, especially by Peters' group, indicate that even a 0.01 ppm limit is too high. NIOSH, in its criteria document for TDI, published in 1973, after a thorough review of the literature available at that time, recommended a workplace environmental standard of 0.005 ppm, as a TWA, with a 20-minute ceiling of 0.02 ppm. The most recent report by Wegman et al indicates a threshold of response at about 0.002 ppm and, even this low value, may not protect sensitized workers."

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I would highly recommend review of Mr. Arrasmith's comments at the hearing proceedings where he stated "went home Friday night, I had a severe sore throat and really dry and cough and I had a little bit of irritation in my chest." Also further statements to the effect...felt like 10 people standing on top of my chest. I was having a hard time breathing. I had a real sore throat again." Later mentioned by the claimant "swelling underneath my arms. I still have the sensation across your chest, when I lay down at night..." If the hearing officer would review the underlined sentences in the attachments to my basic report of December 14, 1984, it should be readily apparent the corollary between the claimant's symptoms/comments and that of documented cases of exposures to TDI. In particular the article entitled Toluene-2, 4-Diisocyanate - Clinical Features, authored by Doctor Rutherford T. Johnstone should help in establishing causation. The key is that a sensitized individual can have an allergic reaction from exposure below established health values, i.e., TLV, PEL.

Respectfully submitted,


Glenn L. Davis
Industrial Hygienist

GLD:gjb

Reference:

- (1) American Conference of Governmental Industrial Hygienists Inc. Documentation of the Threshold Limit Values, Fourth Edition. 1980, (with changes) pp. 401-402.

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The Industrial Commission
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246 N. High St., Col. O. 43215

December 14, 1982

Legal Section
Industrial Commission of Ohio
246 North High Street
Columbus, Ohio 43215

Re: O.D. #19199-22
Richard Arrasmith
Inland Division - GM
Vandalia, Ohio

Attention: Judy Spencer

Dear Ms. Spencer:

On November 3, 1982, I visited the Inland Division plant located in Vandalia, Ohio to investigate the occupational disease claim filed by the aforementioned claimant. He is claiming bronchitis, infected pharynx, congested sinus membranes, diarrhea and cystitis.

Work History:

The claimant was hired on June 13, 1963. He worked in Department 923, Machine Repair and Rebuild from September 23, 1974 to January 25, 1982. Upon return from sick leave January 25, 1982, he was reassigned to Department 23, at another Inland plant in Dayton, again in Machine Repair and Rebuild.

Job Description:

Machine Repair and Rebuild is basically a toolroom; with technicians working out of this area throughout the plant. Attachment 1 is a job classification description for Machine Repair and Rebuild.

Investigation and Findings:

The plant area involved is where polyurethane foam seat cushions are manufactured. The foam containing toluene diisocyanate (TDI) is ejected out of a nozzle spray valve into a seat cushion mold. There are several lines engaged in this process. An extensive local exhaust system is located over each of these lines. On Friday, October 30, 1981, around noon, a TDI leak was reported on line three. Investigation revealed a faulty "O" ring on the foam ejection apparatus causing a pressure leak, releasing a minute quantity of TDI into the immediate shop atmosphere. Direct readings taken with a MDA Autospot portable monitoring instrument by Inland Safety and Industrial Hygiene professionals revealed levels of TDI approaching

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.02 parts per million (ppm). Soon thereafter a temporary plastic bag was taped around the valve to contain the leak. The line was then shut down (until approximately 3:00 p.m.) and the shift sent home. By this time the faulty "O" ring and valve had been replaced, and the second shift which came on at 3:00 p.m., was allowed to operate. The Inland Industrial hygienist reported he rechecked the atmosphere in the vicinity of the repaired leak on line 3 at approximately 5:00 p.m. and determined the TDI exposure level to be less than .005 ppm, or 5 parts per billion. The American Conference of Governmental Industrial Hygienists has established a ceiling level of 0.02 ppm for toluene diisocyanate as a threshold limit value. They have published a notice of intended change in the Threshold Limit Values for Chemical Substances in Work Air for 1982, with the ceiling value for TDI being dropped, and replaced with an eight hour time-weighted average of .005 ppm and short-term exposure limit (STEL) of 15 minutes at 0.02 ppm.

The definition of ceiling value as extracted out of the above TLV booklet is, "The concentration that should not be exceeded even instantaneously." The STEL is defined as, "a 15 minute time-weighted average exposure which should not be exceeded at any time during a workday even if the eight-hour time-weighted average is within the threshold limit value. Exposures at the STEL should not be longer than 15 minutes and should not be repeated more than four times per day. There should be at least 60 minutes between successive exposures at the STEL. An averaging period other than 15 minutes may be recommended when this is warranted by observed biological effects."

It can be seen then that the TDI concentration measured immediately after the leak (.02 ppm) approached the present ceiling TLV of .02 ppm. If it is assumed the level of .005 ppm was the average concentration between 12:00 a.m. (when the leak was discovered) and 3:00 p.m. (start of the second shift) the 8 hour time-weighted average calculates out to be .0019 ppm. This is below the newly intended TLV change of .005 ppm TWA, and 0.02 ppm STEL.

The claimant (as verified on his Inland Medical Record, entry dated November 2, 1981) stated the TDI spill occurred Thursday night - October 29, 1981. Inland Division officials stated there is no record of such a spill or leak occurring at that time; only at the time previously reported, Friday - October 30, 1981. This same entry states the claimant was performing repair on a Y axis above Line 1 from 7:00 a.m. to 2:00 p.m., on October 30, 1981, continuing on October 31, 1981 and November 1, 1981. Line 1 parallels Line 3 where the leak occurred. There is a distance of approximately 40-50 feet between the two lines. Consequently, it can be safely assumed the claimant was in the general area during the time of the leak. However, no direct measurements were taken for TDI in the area of Line 1 where the claimant was working during the time of the pressure leak.

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Inland Division - GM

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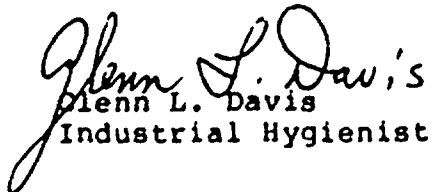
Review of the claimant's medical history discloses allergies to hayfever and dust. On return from sick leave, a medical restriction was given him stating "no exposure to TDI", with him being transferred to another plant in the Dayton area. This restriction was given by the Inland Division plant physician. The claimant's private physician states the claimants respiratory tract has become sensitized as a result of exposure to TDI.

Summary and Conclusions:

The physiological responses experienced by the claimant parallels that of individuals sensitized to TDI. (Attachment 2, 3, 4, 5) The question remains however, as to the claimants actual exposure level to TDI. If he remained 40-50 feet away the exposure was probably nil. Though if by chance, he was closer to the leak, an acute exposure could of occurred.

Again, review of the reference literature attached readily discloses physical distress to sensitized individuals occurring well below the current threshold limit value. As noted previously the claimants private physician alleges respiratory tract sensitization; this seems to be authenticated by the Inland Division Company physician by the no exposure to TDI restriction after returning to work. Consequently, it is possible a cause-effect relationship can be surmised in this case due to the claimant's alleged sensitization to toluene diisocyanate.

Respectfully submitted,


Glenn L. Davis
Industrial Hygienist

GLD/rl

Attachments (5)

1. Inland Division Job Classification
2. Pulmonary Toxicity of Isocyanates, Annuals of Internal Medicine, October 1970, Vol. 73, Number 4, pp. 654-655
3. Proctor N., Chemical Hazards of the Workplace, Lippincott Company, pp. 483-484
4. Johnstone, R., Industrial Medicine and Surgery, Toluene-2,4-Diisocyanate-Clinical Features, January 1957, pp. 33-34
5. Musk, A.W., Journal of Occupational Medicine, Vol. 24 No. 10, Absence of Respiratory Effects in Subjects Exposed to Low Concentrations of TDI and MDI, October 1982, pp. 746-750

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CERTIFICATE OF AUTHENTICITY

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Supervisor, Microfilming Unit

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