



April 17, 1981

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

OD# 13500-22
Clarence Noble
Inland Div.-GM
Vandalia, Ohio

Attn: Judy Spencer

Dear Ms. Spencer:

The claimant, Clarence Noble, worked at Inland Division-General Motors, for almost twenty five years, in a variety of jobs and different departments. Mr. Noble's claim alleges he is suffering from asthmatic bronchitis and chronic obstructive pulmonary disease. (It is impractical to list all the occupations he held while employed at Inland Division. However, I will highlight those occupations which Mr. Noble alleges caused his present physical impairments, and also a review of possible work exposures which I feel are pertinent to his claim.)

The first ten years of employment at the above Plant for Mr. Noble are seemingly uneventful health-wise. Upon commencement of employment March 16, 1953, Mr. Noble states he worked on a tank truck, however, no description of this position was attainable. He was later classified a "Check Material Handler", Dept. 28, from 1954-1958. As previously stated, there were no allegations regarding health effects from working in these positions. Upon transfer to Department 75 on July 24, 1964, through September 9, 1964, he states he was exposed to Toluene diisocyanate used in the manufacture of foam rubber automobile seats. In the affidavit filed with the claim this is the year Mr. Noble first experienced his breathing difficulties.

The Industrial Commission of Ohio • Division of Safety and Hygiene • 246 N. High St. • Columbus, Ohio 43215

James A. Rhodes, Governor • William W. Johnston, Industrial Commission Chairman • W. Craig Zimpher, Vice Chairman • Leonard T. Lancaster, Member
Philip A. Workman, Safety and Hygiene Superintendent • Bob Riley, Assistant Superintendent • Lawrence J. Whalen, Congress Manager

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A visit was made to the Inland Division - Dayton, Ohio, on November 18, 1980, to review Company records regarding toluene diisocyanate exposures in Department 75 during the time period in question, and to collect Mr. Noble's work history. Inland health and safety officials asked this be deferred to allow time to assimilate the requested information. Subsequently, a letter dated December 3, 1980, signed by the Company Senior Industrial Hygienist, and Assistant Director of Health and Safety, stated Department 75 was no longer in existence, nor were exposure records to toluene diisocyanate available (Attachment 1). Further, it was stated wood alcohol at no time had been used in Department 740 where Mr. Noble stated in his affidavit it was used in the cutting of brake hose.

On January 21, 1981, the Inland Plant in Vandalia, Ohio, was physically visited by the undersigned with the Senior Industrial Hygienist mentioned above. What was related in the letter was true in part regarding Department 75 being no longer in existence. Neither was toluene diisocyanate in use at this location.

Further investigation on my part revealed that the National Institute of Occupational Safety and Health (NIOSH), as part of an on-going Health Hazard Evaluation (File HE78-39) of the same Inland Plant had company toluene diisocyanate air sampling exposure data of Department 75. This information had been provided to NIOSH by Inland Division to assist in their evaluation. Subsequently, I requested this information from NIOSH to assist in my evaluation (Attachment 2). It is interesting to note on both my visits to Inland Division that such exposure data for Department 75 was not available. The excerpts included as Attachment 2 indicates that air sampling for TDI was performed by personnel of the Inland chemistry laboratory routinely, and that records were kept.

I have deliberately included as Attachment 2, Inland Division industrial hygiene reports for the time period March 15, 1957 - May 5, 1967. The primary purpose of this action is to give a picture of the processes involved, and an idea of air sampling results, even though the claimant alleges exposure just from July 24 - September 9, 1964.

Review of the above attachment reveals terms expressed such as "...without apparent excessive exposure.", "no more than 0.06 parts per million of TDI", "elimination of objectionable fumes that emanated from the curing oven at times". Mr. Nobel in his affidavit offers a parallel to this in his mention of a foul odor given off by the foam rubber. Continuing review reveals some breathing zone samples for TDI of men placing lids on molds above the permissible exposure limit of 0.02 parts per million, and also of a man operating a foamer, during June 1962. There is continued discussion to improve ventilation in the TDI process. That there is "virtual absence of this contaminant." There is discussion of increased production, of mechanical difficulties with several ovens, and the hypothesis of TDI vapors escaping into the ambient air from mixing tanks. There is mention of plastic bags in cardboard boxes used to catch the waste TDI foam, with

continuing evaporation of TDI vapor from this waste, even though local exhaust ventilation is provided (Dec. 1964). Mention is made of TDI air samples above the permissible exposure limit of the foam operators position on seat pad Line 2 on April 21-22, 1965, with modification of existing exhaust ventilation being planned again. Mention is made of Department 75 wherein after two men clamp a lid on the mold, air samples for TDI exceed the permissible exposure in the breathing zone of the foam operator in the same time period. In conclusion, an air sample taken by the company as late as May, 1967, indicated a level approaching the permissible exposure limit for TDI in the breathing zone of a foam operator on Line 3. This data is presented to indicate that apparently there were continuing problems of eliminating toluene diisocyanate vapors given off by the different work processes, and Inland Divisions' continued modifying and improving local exhaust ventilation systems to contain them.

Currently, the National Institute of Occupational Safety and Health has recommended the permissible exposure level of 0.02 part per million ceiling for toluene diisocyanate be lowered to 0.005 parts per million with a ceiling exposure of 0.02 parts per million allowed for 20 minutes. It has yet to be promulgated into a standard however. The American Conference of Governmental Hygienists proposed a similar change in the Threshold Limit Values for Chemical Substances and Physical Agents in the Workroom Environment with Intended Changes for 1980.

The philosophy of recommended lowering of the toluene diisocyanate permissible exposure limit is explained in the NIOSH Criteria for a Recommended Standard ...Occupational Exposure to Diisocyanates, Pub #78-215, dtd September, 1978, Attachment 3. (One of the labeling requirements for containers of toluene diisocyanate, as recommended by this standard would state, "May cause cough and difficulty in breathing during or after workshift." Mr. Noble, as reported in the medical narrative by Dr. Plessinger, stated that breathing these materials would cause him to have cough, wheezing, tightness in the chest and shortness of breath. Further, that he had similar episodes after he left the plant, and was at home.)

Research of other selected references reveal that such physiological responses is common to workers exposed to toluene diisocyanate. One reference states, the onset of symptoms of sensitization may be insidious, becoming progressively more pronounced with continued exposure over a period of days to months; initial symptoms are often nocturnal dyspnea and/or nocturnal cough with progression to asthmatic bronchitis. Often when the respiratory illness has become incapacitating and the worker has been hospitalized or otherwise removed from the worksite, a return to work causes an acute and severe asthmatic attack almost immediately or within a few hours. In another pattern of sensitization response, a worker who has had only minimal upper respiratory symptoms or no apparent effects from several weeks of low level exposure may suddenly develop an acute asthmatic reaction to the same or slightly higher level. The asthmatic reaction may be severe,

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sometimes resulting in status asthmaticus, which may be fatal. Those persons who are sensitized must not be exposed to any concentration of TDI and must be removed from any work involving possible exposure to TDI. A third type of respiratory response to inhaled TDI is a small decrease in FEV(1 Sec.) in most or all workers exposed to concentrations as low as 0.002 parts per million. This has occurred in many cases, in the absence of overt symptoms of respiratory irritation. High concentrations of TDI produce a sensation of oppression or constriction of the chest; and there may be bronchitis and severe bronchospasm.¹

Another reference states because of TDI's high volatility, exposure can occur in all phases of its manufacture and use. This reference further states that TDI may cause irritation of the eyes, respiratory tract, and skin. The irritation may be severe enough to produce bronchitis and pulmonary edema. Further, that systemic effects that may cause an asthmatic reaction with wheezing, dyspnea, and cough. These symptoms may first occur during the night following exposure to toluene diisocyanate.²

A pamphlet published by the MOBAY Chemical Company, a major supplier of TDI to industry, provides further information regarding toxicity and safe handling of isocyanates. (Attachment 4). This reference states vapor inhalation must be avoided not only because of the bronchial irritation resulting from exposures to high concentrations for short durations, but also because a significant percentage of workers may develop sensitization and subsequent temporarily disabling asthma-like attacks. Apparently such sensitization can follow a few exposures of short duration to relatively high vapor concentrations or a larger number of exposures to concentrations below levels of detection by odor or irritation.

This pamphlet further states that Woodbury² in 1956 reported eight cases of broncho-pulmonary symptoms ranging from mild attacks of cough and tightness in the chest when the employee was exposed briefly to high concentrations of toluene diisocyanate vapor, to incapacitating asthma whenever a sensitized employee was exposed to the slightest odor of the substances.

Review of Chapter III, Biologic Effects of Exposure, of the NIOSH Criteria for a Recommended Standard....Occupational Exposure to Diisocyanates (Attachment 3), reports similar studies and industrial experiences with or chronic bronchitis, along with sensitization are common. There is mention of chronic impairment of pulmonary function, and of decreased ventilatory capacity (FVC and FEV1) from exposure. Continual references are made regarding asthmatic responses up to and including development of severe asthma. Also of the temporary relief of loss of lung function with the use of a bronchodilator.

Mr. Clarence Noble's medical diagnoses, and symptomatology reveal a seemingly conclusive parallel to the aforementioned references with regard to exposure to toluene diisocyanate.

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The claimant mentioned that from 1964 to 1973 he cut brake hose, using wood alcohol in the process. Review of this process revealed brake hoses being cut in a cutting machine with isopropyl alcohol in a pan at the bottom of the machine. Air samples of this process taken in September, 1976 by the Division of Safety and Hygiene revealed airborne concentrations of 83.7 parts per million. The threshold limit value is 400 parts per million. Isopropyl alcohol can cause dizziness, and nausea at high concentrations. Also, it can be absorbed through the skin to cause similar symptoms. Review of the claim file reveals the claimant experiencing skin irritation from exposure to the alcohol. I cannot relate this type exposure to his claim of chronic bronchitis, bronchial asthma, and chronic obstructive pulmonary disease.

In the balljoint area I could see no direct exposure to oil mists. The machines are enclosed with 1/4" plexiglass; the primary purpose of which is noise suppression. Further, the worker is not required to manually operate the presses since they are automated.

The claimant states the plant was very dusty. On the day of my visit this was not true. The only reference I can apply to this statement is again when Mr. Noble worked in Department 75 (Attachment 2) where there is comment on several occasions to dust clogging up filters, or the use of atomite powder (calcium carbonate) in mixing tanks. One air sample for dust in this area reported 5,000,000 particles of dust per cubic foot of air, which is well below the current permissible exposure standard for nuisance dust.

The claimant further states alleged exposure to diesel fuel emissions given off by forklift trucks passing through his work area. Exhaust emissions given off through diesel exhaust are primarily carbon dioxide, carbon monoxide, nitrogen dioxide, water vapor, and free nitrogen. Other exhaust pollutants include hydrocarbons, particulates, sulfur dioxide, and odor. I could see no forklift truck operations/activities in the areas I visited. As noted, in Attachment 1 it is stated Diesel lift trucks are used sparingly at Inland. I would have to agree with this statement. I would have to assume since the exposure to forklift diesel emissions was transitory in nature that health effects were minimal. At the most contributory in nature to the already medically diagnosed respiratory problems.

In conclusion, I would think it fair to assume a direct cause-effect relationship with the claimants exposure to toluene diisocyanate, and its subsequent health effects. The other allegations however are non supportive, with the exception of perhaps the contributory effects of transient diesel emissions.

Respectfully submitted,

Glenn L. Davis
Glenn L. Davis
Industrial Hygienist

Attachments

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References

1. Chemical Hazards of the Workplace, Proctor, page 483.
2. Occupational Diseases, A Guide to Their Recognition, Rev. Edit June, 1977, U.S. Dept. of HEW, NIOSH, pp. 233-235.
3. NIOSH Criteria For a Recommended Standard ... Occupational Exposure to Diisocyanates
4. Toxicity and Safety Handling of Isocyanates.

GLD/nlg