



WWW.FORCON.COM

THE CONSULTANTS PERSPECTIVE

A SUGAR PUBLICATION

FORENSIC ENGINEERING AND EXPERT WITNESS SERVICES

SPRING 2007

ENVIRONMENTAL LITIGATION & TOXIC TORT EDITION

Toxic Torts, What's on the Horizon? An Industrial Hygienist Perspective

by
Michael L. Cannon, CIH

INTRODUCTION

Industrial hygiene has been defined as "that science and art devoted to the anticipation, recognition, evaluation, and control of those environmental factors or stresses arising in or from the workplace, which may cause sickness, impaired health and well-being, or significant discomfort among workers or among the citizens of the community." The concepts of industrial hygiene began as early as the first century AD when Pliny the Elder a Roman scholar perceived health risks to those working with zinc and sulfur. He devised a facemask made from an animal bladder to protect workers from exposure to dust and lead fumes. In 1556, the German scholar, Agricola, advanced the science of industrial hygiene, in his book *De Re Metallica*, where he described the diseases of miners and prescribed preventive measures. The book included suggestions for mine ventilation and worker protection, discussed mining accidents, and described diseases associated with mining occupations such as silicosis. In the early 20th century Dr. Alice Hamilton pioneered industrial hygiene in the United States beginning with investigations of lead poisoning among enameled bathtubs. Her findings led to sweeping reforms, both voluntary and regulatory, to reduce occupational exposure to lead. Other investigations for which she is known include studies of mercury poisoning in hatters, carbon monoxide poisoning in steelworkers and "dead fingers" syndrome related to the use of jackhammers.

In other words, industrial hygienists see a chemical or product from its genesis as a raw material through the full industrial process to the final product used by the consumer. The benefit of seeing the full production process enables the industrial hygienist to understand the potential exposure risks that may occur from handling the raw material to the end use as a finished product. For example, the production of pressed wood products has utilized a formaldehyde based resin as an adhesive to bond the wood materials together. The manufacturing process created a potential exposure to free formaldehyde, which is a respiratory irritant and is listed as a probable human carcinogen by the EPA. The concern for formaldehyde exposure in the workplace led OSHA to promulgate an air contaminant standard to regulate the

concentration of this chemical in the workplace. The installation of these wood products containing formaldehyde based resins in housing, both standard and manufactured, led to concerns regarding exposures to this chemical by homeowners. This concern resulted in actions by the EPA, the Consumer Product Safety Commission (CPSC) and the Department of Housing and Urban Development (HUD) to bring attention to this potential exposure risk which led to the pressed wood industry as well as other home products industries such as upholstery and carpet manufacturers to reduce the amount of formaldehyde used in their products. As a certified industrial hygienist (CIH) I was called on not only to evaluate the workplace where these wood products were made but also to evaluate manufactured and newly constructed homes for formaldehyde emissions. It is from this perspective as a CIH that I offer the following observations for what types of toxic tort exposures may be on or are already above the horizon.

Diesel Particulate Matter (DPM) emissions from diesel engines is undergoing a great deal of debate in the metal and non-metal mining industry under MSHA regulation 30 CFR Part 57. Exposures to DPM in the mining industry has reportedly caused respiratory illness and other related symptoms in miners. The EPA considers DPM as "likely to be carcinogenic to humans" whereas the National Institute of Occupational Safety and Health (NIOSH) lists DPM as a "potential human carcinogen". The population of workers affected by DPM is widespread and may include miners, diesel truck drivers, diesel bus drivers, railroad workers and diesel mechanics. It should also be noted that California is regulating diesel emissions in its state and the EPA has enacted regulations to reduce emissions from diesel engines for the heavy-duty trucking industry due to the risk of potential respiratory injury to the general population. This will likely create concerns for children riding on diesel powered school buses and those living in urban areas where diesel powered mass transit is used. In fact, the Pittsburgh Tribune-Review published a story on May 8, 2007 regarding school bus diesel pollution and exposures to children who ride these buses. This report pointed out that the Pittsburgh Public School System has enacted a "Healthy School Bus Fund" to retrofit their school bus fleet with pollution control devices to reduce diesel exhaust emissions. There will likely be more concern raised by the general public regarding DPM as awareness is increased by other environmental issues such as carbon dioxide emissions and global warming.

Hexavalent Chromium is used or is a by-product in a multitude of industries for which OSHA has recently enacted a regulatory standard 29CFR 1910.1026. According to OSHA "industrial uses of hexavalent chromium compounds include chromate pigments

in dyes, paints, inks, and plastics; chromates added as anticorrosive agents to paints, primers, and other surface coatings; and chromic acid electroplated onto metal parts to provide a decorative or protective coating. Hexavalent chromium can also be formed when performing "hot work" such as welding on stainless steel or melting chromium metal. In these situations the chromium is not originally hexavalent, but the high temperatures involved in the process result in oxidation that converts the chromium to a hexavalent state." Hexavalent chromium may also be found as an impurity in Portland cement. High concentrations of hexavalent chromium can cause upper respiratory and skin irritation. Workers may also develop an allergic asthma like reaction to hexavalent chromium. Exposure to hexavalent chromium may also increase the risk of lung cancer. Potential exposures to hexavalent chromium to the general public may include sanding of painted surfaces containing this compound in the pigment, handling bags of Portland cement with trace amounts of this compound and weekend welders welding on stainless steel. Therefore, those who have lung cancer and have had potential exposure to hexavalent chromium at work or at home may seek a legal remedy for their lung injury.

Fungi/Mold exposures have certainly taken the property insurance business by storm. What used to be a simple matter of water extraction, removal of damaged building materials and household items now has property adjusters dealing with health related claims from the insured. Water damage that goes unmitigated can result in mold growth on building materials that include drywall, wallpaper, upholstered furnishings, wood structural materials, carpeting and wood furnishings. The types of mold that result from water damage can range from Cladosporium, a very common leaf shed environmental mold to longterm water indicator molds such as Stachybotrys. The most common health effects from mold exposures result in allergic reactions in sensitive individuals. However, some molds have been alleged to cause memory loss, persistent headaches, loss of appetite, depression and severe respiratory effects for those who have been reported as healthy individuals. There are no specific regulatory statutes that govern exposure to mold in the workplace, commercial buildings or the home. This is where the debate begins and the difference in opinion with regards to the health effects of mold has created a favorable environment for toxic tort litigation. There are myriad of conditions that influence the indoor environment that may cause symptoms in building occupants that are unrelated to mold. Housekeeping practices, other chemical emissions from building or cleaning products, human occupancy levels, human shed bacteria, outside conditions, e.g. pollens, cooling tower water, HVAC performance in maintaining thermal comfort, lighting and ergonomics may play a role in creating symptoms unrelated to mold exposure. One must also consider the human condition and the current health status of the individual reporting that they have been exposed to "toxic mold", because it seems that mold exposure no matter how slight or remote becomes the cause of last resort when no other explanation can be found for the reported symptom or illness.

Benzene is an aromatic hydrocarbon solvent that has been detected in many chemical products used both in the home and workplace. According to the EPA ambient benzene concentrations in urban areas ranges between 3 to 20 parts per billion. This background level in urban areas can be attributed to industrial sources, gas stations and automobiles. Products in addition to gasoline that may contain benzene include paints, glues, cleaning solvents, finger nail polish, inks and pesticides. Reagent grade ethyl alcohol used in the laboratory typically was spiked with a trace amount of benzene to discourage its use as drinking alcohol. Trace benzene exposure may also occur when smoking cigarettes

or when in contact with second hand smoke. The amount of benzene in many of these products is considered less than 0.1 percent, thereby not required to be listed in a material safety data sheet per the OSHA hazard communication standard 29CFR 1910.1200. Therefore the indoor environment where these products are used or where smoking occurs may contain trace amounts of benzene. Benzene is considered a human carcinogen, which can cause acute myelogenous leukemia (AML). The link between AML and benzene has been recognized in industrial workplace settings where exposures were in excess of regulatory standards. Recently, toxic tort claims have arisen from alleged trace benzene exposures that have resulted in various blood disorders and blood cancers. The debate then hammers at the "no safe threshold" versus the "dose/response curve" used to establish regulatory standards for the workplace and ambient air. An accurate assessment of the environment where the alleged trace benzene exposure occurred, if relevant, by a CIH can provide a starting point for this debate.

A CIH can be a valuable asset to a toxic tort litigation team because we have a broad as well as detailed knowledge that goes into evaluating exposures to various chemicals that have a production pathway. Whether it is the actual raw material in question, the by-product of a chemical process or the actual end product, industrial hygienists can provide a unique perspective on how these different exposure scenarios relate to the potential risk of health effects.

ABOUT THE AUTHOR

Forcon Consultant Michael L. Cannon, CIH - Has over 27 years of comprehensive industrial hygiene experience including asbestos contamination & abatement; mold contamination assessment and remediation, risk assessment of major corporations including asbestos abatement contractors, petroleum refineries, chemical manufacturers, chemical distributors, hazardous waste processors, TSDR's, transportation firms, and lead-based paint abatement contractors.

Mr. Cannon has provided industrial hygiene services for investigations of possible exposures to hydrogen sulfur/ sulfide compounds, inorganic arsenic, respirable crystalline silica, benzene, hydrogen fluoride, radon, methylene chloride, formaldehyde, fungi, welding fumes, lead, phenols, metal fumes, carbon monoxide, elemental carbon, CTPV's, benzidine - based dyes, aromatic and chlorinated hydrocarbons, rosin core pyrolysis products, and many other sources of possible toxic exposure.

Mr. Cannon can be reached through Forcon's Atlanta office.

FORCON International Offices

Amherst, VA	(434) 384-6504	Atlanta, GA	(770) 390-0980
Pentwater, MI	(231) 869-2017	Richmond, VA	(804) 285-7870
Tampa, FL	(813) 684-7686	Red Hill, PA	(215) 541-1450

**For Environmental Litigation and Toxic Tort related services
contact: Bill Ver Eecke 1-800-390-0980**

DIESEL ENGINE/ EMISSION EXPERT

RICHARD B. GIBSON

Resume supplement expanding on Diesel Engine Experience.

Over 40 years in the design, maintenance, development, testing and analyzation of Diesel engines. Mr. Gibson's experience outside of Diesel engines may be found on his other resume on Forcon's website under the Atlanta office.

EDUCATION

BSME University of Pittsburgh
MSM (MBA) Frostburg State University

Mack Trucks Inc. - Mack Trucks is the only integrated truck manufacturer in the United States. This means they design, develop, and manufacture Diesel engines, transmissions, rear axles, chassis and cabs. Mr. Gibson began his Mack career in Diesel engine design, specializing in valve train components. In this capacity he received a Patent for a variable valve train system. Mack used it as an engine retarder marketing it under the name Dynatard. The Patent ran out in 1990; however many other manufacturers have used the principles of the invention for variable valve trains as a method to improve emission and fuel economy. As time progressed Mr. Gibson became responsible for complete engine designs. Through promotion he advanced to Chief Engineer of Power Trains (1967 to 1983) then Chief Engineer of Vehicle Laboratories then Chief Engineer of Vehicle Development (All of the advanced truck products).

The Clean Air Act was first promulgated in 1968. In those early years Mack began emission work with South West Research of San Antonio and Mr. Gibson maintained a relationship with them through out his career. This early work permitted Mack to build and develop their emission cells and their own research group. In 1971 Mr. Gibson and a colleague developed the first humidity correction factor for gaseous emissions. Three years later the Federal Government funded an expensive study that produced the same results. During his time at Mack he was deeply involved in the pursuit of meeting gaseous emission standards. Mack would also use engines from Cummins, Caterpillar, and Detroit Diesel. Due to this relationship they maintained close technical ties and participated in development of their products.

From 1968 to 1989 Mack was part of Signal Oil and Gas conglomerate. Garrett Air Research was a sister company. They provided Turbo Chargers for Mack engines. In the early 70's working with Garrett, Mack introduced the first air to air charge air intercooling system. This allowed improvements in emission while maintaining power levels and improved fuel mileage.

EZGO Golf Car (A Textron Company): The EZGO experience is significant because of the engines. As their Vice president of Engineering Mr. Gibson lead the effort with their Japanese engine supplier to design and develop a new four cycle gasoline engine replacing the outdated two cycle.

Ford New Holland (Sold in 1992 to Fiat): Worked as Power Train Manager with agricultural Diesel power plants in the United States and Europe.

Blue Bird Bus: Blue Bird Bus, builds a complete line of Diesel powered buses for the school systems, commercial and motor

homes. As Vice President of Engineering Mr. Gibson was involved in the specifications for Diesel power from all of the major engine manufacturers. This required a review of their designs and development as well as their manufacturing plants and processes.

In an effort to supply low emission vehicles to the school and commercial market place Blue Bird embarked on the development of natural gas engines. This work was in conjunction with South West Research and John Deere. They developed/converted natural gas engines from gasoline V8's and inline six cylinder Diesel engines.

Orion Bus: Director of Engineering: Specifying and developing Diesel and natural gas engines for the commercial bus industry.

Bearing Truck: Vice President of Engineering - This was a start up company that failed, however they successfully worked with Hyundai of Korea to develop a line of trucks for the United States market. This required Mr. Gibson to work in Korea helping with development for U.S. Diesel emission standards.

Present: Work - part time, in retirement, as an automotive consultant to Forcon on cases involving diagnosing Diesel engine failures and emissions.

FORCON's Areas of Expertise

Accident Reconstruction	Architecture
Automotive Fires, Failures & Theft	Biomechanics
Boat Accident Reconstruction	Catastrophe Engineering
Chemical Engineering	Chemistry
Civil Engineering	Codes & Standards
Construction	Electrical Engineering
Electronics	Environmental Engineering
Fire Protection Engineering	Geohydrology
Geology	Geotechnical Engineering
Highway Engineering	Industrial Hygiene
Injury Causation	Materials Engineering
Marine Engineering	Mechanical Engineering
Metallurgy	Roofing
Safety/OSHA	Soils Science
Structural Engineering	Toxic Torts

and more!

For Forcon' complete Environmental Litigation and Toxic Tort team, go to www.forcon.com.

FORCON INTERNATIONAL CORPORATION

PRESENTS

THE CONSULTANTS PERSPECTIVE

IN THIS ISSUE ! - AN ARTICLE ON

***Toxic Torts, What's on the Horizon? An Industrial Hygienist
Perspective***

&

Diesel Engine / Emission Expert

FORCON INTERNATIONAL CORP.
1216 Oakfield Drive
Brandon, Florida 33511