Together, we can make Ohio jobs safer.
DIVISION OF SAFETY AND HYGIENE
THE INDUSTRIAL COMMISSION OF OHIO
246 N. High St., Col., O. 43215

May 26, 1987

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

Re: OD #189927
Karl Schaefer (Deceased)

Attn: Judy Spencer

Dear Ms. Spencer:

On April 16, 1987, the Koppers Co., Front Street, Toledo, Ohio was visited to gather information on the above claim. Jacque Brown, Safety Director, was interviewed and provided specific employment and exposure information.

The deceased's cause of death was anaplastic carcinoma well metastasized in the bone, nervous system and probably the lung. The medical history is in the facsimile file.

Koppers

Koppers was the Interlake Iron and Coke Co. in 1965, when the decedent was hired. Interlake started as a pig iron smelter including coke manufacturing facilities next to the furnaces. The smelter was shut down in the 70's and only the coking operation retained. Three groups of coking ovens (A, B, C) were operated, but as of 1987 only C group (battery) continues.

Coke is the carbonaceous residue of destructive distillation of bituminous coal. At Koppers, there are 51 ovens each 8 feet high 30-40 inches wide and 25-30 feet deep where coal is loaded from the top. The top openings are called lids. The coke is ejected by a hydraulic ram running the depth of the oven into open topped rail dumb cars. Water is sprayed on the hot coke to quench it. The coke is then shuttled to an outdoor holding area.

The decedents medical history is in the facsimile file. His 15 pack year history, from cigarettes, is noted in the facsimile file.

History of Employment

The following is a brief history of employment for the decedent, Karl Schaefer.

Hired by Interlake on 4-8-65 as a laborer and he worked in that classification until 6-8-65 when he became a Wireman (Electrician).

From 6-9-65 until 8-12-73 he worked as a Wireman (Electrician) at the furnace end of the plant.

From 8-13-73 until 6-29-80 he worked as a Powerhouse Electrician at the furnace end of the plant.

On 12-15-78 Koppers bought the Toledo coke plant from Interlake.

From 6-30-80 until 9-1-8 he was an Electrician at the coke plant averaging 2.875 hours per week working at the coke ovens, mostly out of the restricted areas.

From 10-1-80 until 8-24-81 he was on strike and on layoff.

From 9-2-80 until 10-1-80 and again from 8-24-81 until 9-27-82 he was a laborer at the coke plant averaging 4.48 hours per week working on the coke ovens. He never worked more than 24 hours in any week on the ovens.

From 9-27-82 until 10-18-82 he was an Electrician at the coke plant with an average of 2.875 hours per week on the ovens, most of which was not in the restricted area.

From 10-18-82 until he left on sick leave on 12-7-83 he was an Instrument Repairman averaging 22.28 hours per week at the coke ovens. The current Instrument Repairman, Thomas Gilbert, estimates that he spends 10-15 minutes per day, or 50-75 minutes per week in the restricted area of the coke ovens. The balance of the time is spent in the pin room, control room and the basement of the coke ovens, none of which are considered restricted areas.

All periods of time worked on the coke ovens are from pay records that are broken down by department to enable the time worked by employees to be charged off to the department in which he worked.

From hire date until January 1970 he worked at the furnace end of the plant and would have between 550 and 2100 feet from the nearest coke oven.

In January 1970 the ovens of A Battery and B Battery were permanently shut down.

From January 1970 until 6-30-80 he would have worked between 1100 and 2650 feet from the nearest coke oven. While working in the powerhouse he would have been over 2000 feet from the operating coke ovens.

The decedent's job classifications need some elaboration. The Wireman or electrical maintenance person only does electrical work.

A laborer performs mostly clean-up, anywhere in the plant, but may be shifted to other jobs as necessary. The decedent, at times, was moved from a laborer to lidman. A lidman opened the oven tops to allow recharging. An instrument repairman is just that. There may have been other work areas the decedent was assigned when he was a laborer but they are not documented.

Exposure Discussion

There are no Koppers Co. environmental exposure information prior to January 1979, and especially furnace area electricians. There are some numbers available form January 1979 to December 1983 in the decedent's various job classification as provided by Koppers. The included exposures, other than lidman, were of the decedent.

See attached table for Time/Job Classifications for Karl Schaefer's Work History with Koppers.

The exposure numbers are reported in milligrams per cubic meter of benzene soluble fraction of total particulate matter. This fraction is referred to a poly nuclear or polycyclic aromatic hydrocarbons (PAH).

Exposure Conclusions

The decedent was exposed to coke oven emission products of varying daily concentrations, but of unknown duration.

Coke Oven Emission (COE) Health Effect Potential From Various Sources

Coke oven emissions are a complex mixture of particulates, vapors, and gases which includes numerous polynuclear aromatic hydrocarbons, many of which are carcinogenic. High respiratory mortality among coke oven workers in Great Britain is reported. Kidney and lung cancer was relatively prevalent among American coke-oven workers exposed 5 years or more. Animal studies indicate lung and kidney tumors by coal tar aerosols.[3] When aerosol concentrations are maintained below 0.2 mg/M^3, any increase in the incidence of lungs and other tumors, due to occupational exposure should be minimal.[1] This concept is statistically significant, but does not eliminate sensitive individuals.

The PAH's include, but are not limited to, Benz(a) anthracene, chrysene, pyrene and benzo(a) pyrene, which are carcinogenic. There are many other PAH's including fluoranthene, naphthacene pentaphene and various others, which do not cause cancer.

PAH's can be found almost everywhere in air, soil and water originating from natural and manmade sources. Forest fires and volcanoes are some minute natural sources. PAH's also occur in tobacco smoke and grilled, smoked and fried foods. But, the primary exposure source is coal tar or coke oven emissions. Personal sample has shown coke oven exposures to be the highest in wharfman, lidmen, tar chasers, and jamb cleaners. It has been determined that some workers in modern coke oven operations are exposed to PAH's in rather high levels.[2]

Chemical Hazards of the Workplace by Proctor and Hughes, 1978 notes that mortality from lung cancer for partial coke oven topside (lidmen) workers is 2.5 times the expected rate. Side oven workers (door machine and pusher machine) have 1.7 times the normal lung cancer mortality. These figures are five or more years exposure in a specific job category. As employment length increases so does mortality. Twenty years of topside work shows a lung cancer rate twenty times normal.[3]

Smoking

Eighty to eighty five percent of all lung cancer deaths are attributable to cigarette smoking. The same percentage of deaths is caused from larynx cancer. Oral, esophagus, bladder, pancreatic, stomach and kidney cancer deaths has a significant increase in potential for smokers. A dose response relation to the cancers and smoking history has significance; as cigarettes per day increases, so does risk.[4]

Conclusions

The decedent was exposed to cancer causing agents, both occupationally and socially. The social exposure were from cigarettes, food and the ambient air. Possible synergism, cancer etiology and individual susceptibility significantly clouds a specific cause and effect relationship.

Sincerely,

Richard Wilder

Richard Wilder
Industrial Hygienist

RW/dk

References:

1. Documentation of the Thresbold Limit Values, 1986, Coal Tar TLV's, American Conference of Governmental Industrial Hygienists.

2. Encyclodaedia of Occupational Health & Safety, 1983, Coal Tar Emissions, International Labor Organization.

3. Chemical Hazards of the Workplace, 1978, Coke Oven Emissions, Proctor and Hughes.

4. Smoking: Health Effects and Control - November 15, 1985, New England Journal of Medicine.

TIME/JOB CLASSIFICATIONS FOR KARL SCHAFFER'S WORK HISTORY WITH KOPPERS

Time Period	Representative COE* Exposures		Job Classification
January, 1979 to September, 1980	2nd Quarter 1979	0.03 mg/M^3 BS**	Electrician
	3rd Quarter 1979 (oven maintenance)	0.02-0.10 mg/M^3 BS	
	4th Quarter 1979	<0.01-0.18 mg/M^3 BS	
	1st Quarter 1980	<0.01-0.04 mg/M^3 BS	
	2nd Quarter 1980	0.04 mg/M^3 BS	
	3rd Quarter 1980	<0.01-.18 mg/M^3 BS	
September, 1980 to October, 1980		No "laborer" data	Laborer
October, 1980 Plant Strike - Released; Returned August, 1981			No exposure
September, 1982 to December, 1983	4th Quarter 1982	0.03-0.06 mg/M^3 BS	Electrician
	1st Quarter 1983	0.02-0.06 mg/M^3 BS	
	2nd Quarter 1983	0.00-0.12 mg/M^3 BS	
	3rd Quarter 1983	0.00.0.05 mg/M^3 BS	
	4th Quarter 1983	0.00-0.02 mg/M^3 BS	
December, 1983 - Hospitalized	---	---	---

*CO - Coke Oven Emissions

**COE Standard,, Permissible Exposure Level 0.15 mg/M^3 Benzene Solubles (BS).

EXPOSURE RANGE OF LIDMAN FOR COKE OVEN EMISSIONS

Time Period	Representative Exposures
3rd Quarter 1981	0.04-0.86 mg/M^3
4th Quarter 1981	0.56-0.84 mg/M^3
1st Quarter 1982	0.04-0.96 mg/M^3

7