

You can use refined coal tar sealer safely

Air quality studies show emissions are well below occupational health limits

By Allan Heydorn, editor

Refined coal tar sealer poses no inhalation exposure risk to applicators, manufacturers, or the general public, according to air sampling studies conducted in 1990 and 1991.

The studies showed that airborne concentrations of all compounds tested were below applicable Permissible Exposure Limits (PELs) as established by the Occupational Safety and Health Administration (OSHA).

The five air monitoring studies were conducted by Koppers Industries Inc., a supplier of the refined coal tar used in pavement sealer. Also participating were Gem-Seal Inc., Neyra Industries Inc., and SealMaster Inc., manufacturers of refined coal tar sealers.

These studies represent the on-

ly comprehensive examination of potential airborne emissions from refined coal tar sealer available.

Koppers initiated the studies in response to charges that refined coal tar sealer has been classified as a carcinogen by OSHA and the Environmental Protection Agency. But neither OSHA nor the EPA has classified refined coal tar sealer as carcinogenic.

It is true that chronic overexposure (defined as five days a week, eight hours a day, for 30 years) to unrefined coke oven tar might cause cancer, in humans primarily skin cancer.

But refined coal tar sealer is manufactured with RT-12, a refined coal tar that meets ASTM D 490 specifications and that is selectively manufactured for use in pavement sealers.

Cancer warning statements for materials derived from coke oven tar—which includes refined coal tar (RT-12)—are based primarily on tests in which unrefined coke oven tar was applied directly and repeatedly to the skin of laboratory animals. Other data used includes data obtained from coke

oven workers and from workers in the roofing trades.

In the absence of specific data on refined tar, cancer warning statements on refined tar labels and material safety data sheets are required based on materials and conditions not representative of refined coal tar pavement sealer use, but rather crude coke oven tar and related occupations.

Coke oven tar components associated with cancer risk were measured in the Koppers tests and found to be well below occupational exposure limits. Not only did the studies find airborne levels below OSHA's PELs, measurements were also below the Analytical Limit of Detection, a measurement indicating the smallest amount of a substance that can be determined by a specific method.

What was tested

Refined coal tar is a complex mixture of many compounds. The complexity of this mixture, coupled with the collection and analytical limitations associated with personnel air sampling, meant that the test could not

measure and evaluate all the constituents of refined coal tar. Koppers also decided it was unnecessary to test all components of refined coal tar because under normal ambient application conditions, potential airborne release is limited to only a small group of the components given the physical and chemical properties of refined coal tar. In addition, health effects data and occupational exposure limits are available only for a limited number of materials.

For those reasons, Koppers decided to sample and analyze refined coal tar emulsions for the following materials:

- Organic vapors (benzene, toluene, xylenes, naphthalene)
- Tar acids (phenol, cresols)
- Coal tar pitch volatiles (CTPVs)
- Polynuclear aromatic hydrocarbons (15 specific compounds identified by OSHA as having carcinogenic potential)

Benzene, xylene, toluene—

All volatile organics, these three light oils have low to moderate odor thresholds, are absorbed by the skin, and can cause dermatitis and defatting. Of the three, only benzene is classified as a suspect carcinogen, hence the reason for its significantly lower OSHA PEL of 1.0 ppm as compared to 100 ppm for xylene and toluene. Xylene and toluene are chemically similar to benzene and might be restricted in the future.

Naphthalene—One of the primary causes of the unpleasant odor of coal tar sealer, naphthalene is also an eye, nose and throat irritant. It has an OSHA PEL of 10 ppm.

Phenol and cresols—These tar acids also have low odor thresholds. They are absorbed by the skin and are corrosive irritants. Each has an OSHA PEL of 5.0 ppm.

Coal tar pitch volatiles—Koppers decided to analyze the air samples for CTPVs because, while OSHA has no air standard for refined coal tar, the Coal Tar Pitch Volatiles Standard has tra-

Figure 1 Hand Spray Application Monitoring Results

Average airborne concentration compared to OSHA Permissible Exposure Limit (PEL)

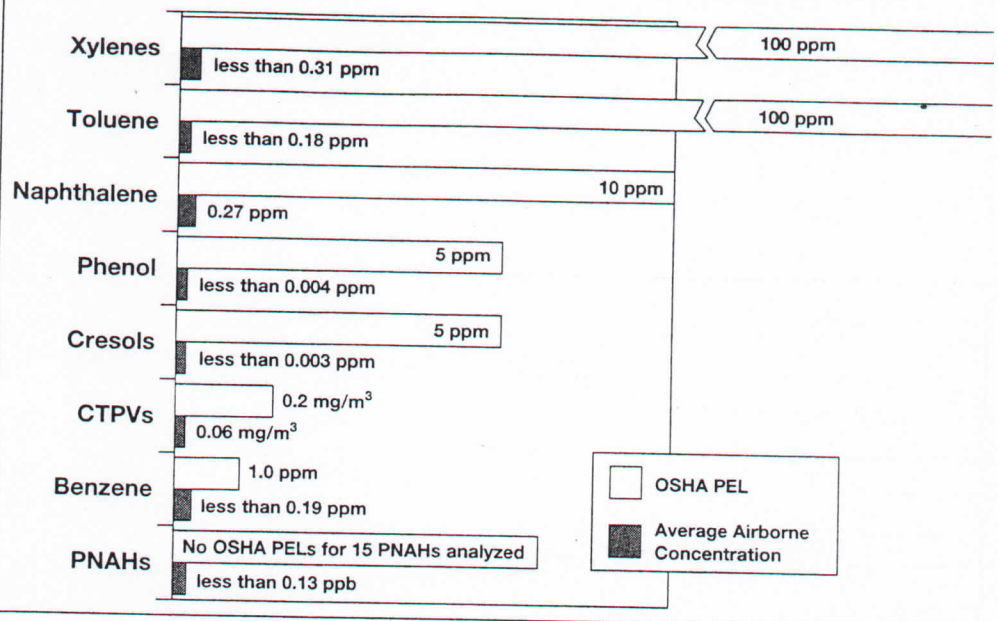
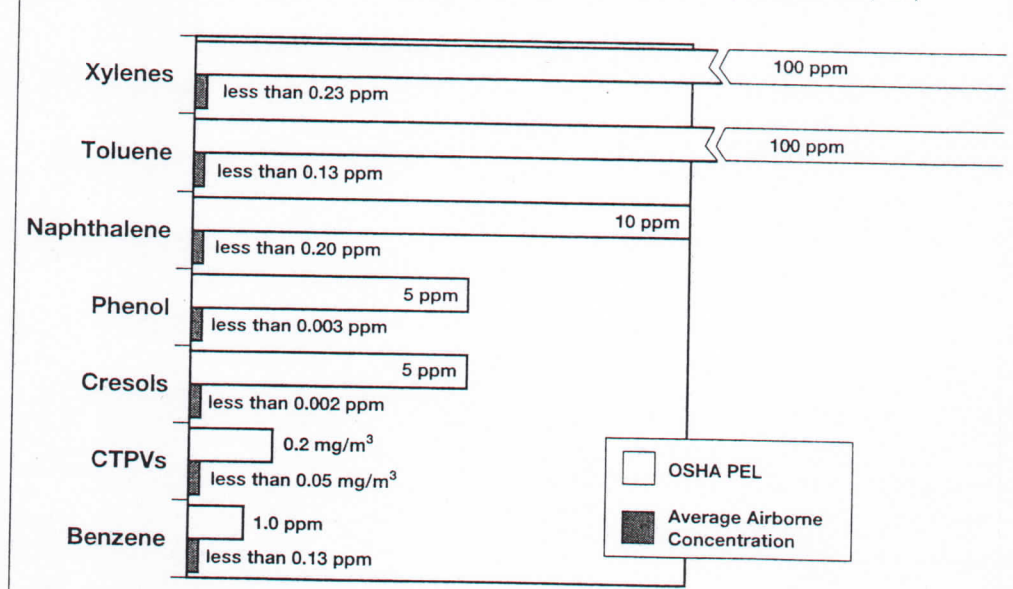


Figure 2 Drag Box Monitoring Results

Average airborne concentration compared to OSHA Permissible Exposure Limit (PEL)



ditionally been used to evaluate coal tar based products, including refined coal tar. The OSHA PEL is 0.2 mg/m³. The CTPV Standard is taken to be an indicator of polynuclear aromatic hydrocarbon (PNAH) presence.

Polynuclear aromatic hydrocarbons (PNAH)—These

compounds are characterized by a strong odor, skin irritation, and as an experimental animal carcinogen affecting particularly the skin and lungs. The study evaluated 15 specific PNAHs. These were selected because they are used by OSHA as an index of carcinogenic potential.

Figure 3 Squeegee Machine Monitoring Results

Average airborne concentration compared to OSHA Permissible Exposure limit (PEL)

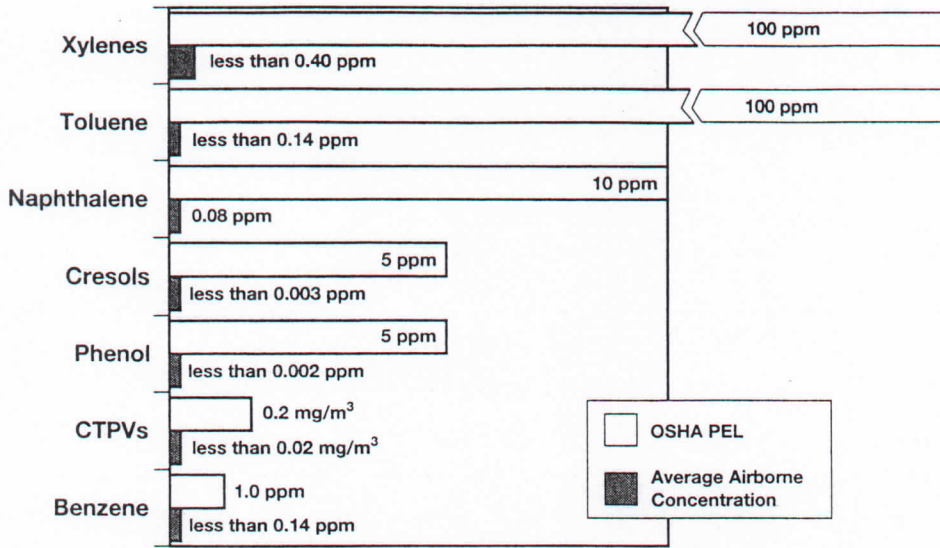
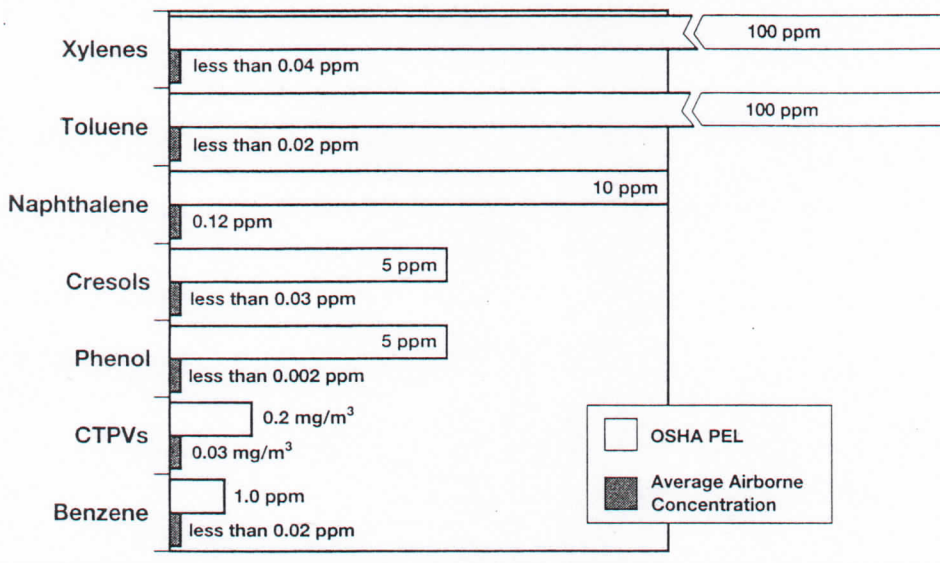


Figure 4 Head Space Emissions Sealed Pavement Monitoring Results

Average airborne concentration compared to OSHA Permissible Exposure Limit (PEL)



Test results

In order to determine the inhalation exposure potentials and airborne emission of refined coal tar emulsion components on workers, breathing zone air samples were collected under a variety of conditions: hand spray, drag box, and squeegee machine application; pail filling; truck loading; and emulsion manufacture. It also collected and ana-

lyzed air samples from recently sealcoated pavement as it was drying.

Survey results indicate that airborne emissions of refined coal tar sealer components are insignificant compared to occupational health limits established to prevent long-term health effects.

Hand spray application

In all cases, airborne levels of

volatile organics and semi-volatile organics were below detectable limits (Figure 1). CTPVs were detected on roughly 70% of the samples.

“However, the average concentration of those detectable levels was 0.07 mg/m³,” the study found.

And, in those cases where CTPVs levels were detectable, all data were well below the OSHA PEL (0.2 mg/m³).

The report notes that “Analysis for 15 PNAHs was undertaken on the highest CTPVs samples. The resulting concentrations were below the analytical limits of detection (0.1-0.2 part per billion) for all the 15 polynuclear aromatics.”

Drag box and squeegee machine application

“All airborne concentrations of volatile and semivolatile organics as well as CTPVs were below the analytical limits of detection,” the report states (Figure 2 and Figure 3).

PNAH analyses for this section of the study were not done because CTPV results were not detectable.

Sealed pavement emissions

Over the years, refined coal tar emulsion has been attacked not only as a hazard to those who work with it, but also to those who come in contact with it as it’s drying or even after it’s cured. The Koppers test examined these accusations also and found no foundation for the claims.

Two tests were conducted. In the first test, referred to as the Head Space Test (Figure 4), air samplers were placed directly on the surface of sealed pavement within 15 minutes of sealer application. Located inside a 2.5 cubic foot enclosure, these samplers analyzed air from a 2-sq.-ft. area of pavement.

“With the exception of naphthalene, all airborne data for volatile and semivolatile organics were at or below the analytical limits of detection,” the study

found. Detectable naphthalene levels were 0.12 ppm, which is less than 2% of the permissible limit of 10 ppm.

CTPVs were present at roughly the limit of detection where the average concentration was 0.03 mg/m³ and the OSHA PEL is 0.2 mg/m³. Because of the negligible CTPVs results, PNAH analyses were not undertaken.

Fugitive emissions test

This test (Figure 5) measured emissions from the sealed pavement into open air—in other words, without the use of a container to concentrate possible emissions as in the Head Space Test. As in the Head Space Test, all airborne data—with the exception of naphthalene—for volatile and semi-volatile organics as well as CTPVs were at or below the analytical limits of detection.

Detectable naphthalene levels again were 0.12 ppm, which is less than 2% of the permissible limit of 10 ppm.

Safety first

While these results should ease your mind, they shouldn't make you any less diligent about following proper handling procedures.

- Read the Material Safety Data Sheet and/or product label before use.
- Avoid prolonged direct contact with skin and eyes. Wash with soap or waterless cleaners.
- Thoroughly wash hands before handling food, tobacco products, or using rest facilities.
- Full-length clothing (long sleeve shirts, long pants) should be worn at all times.
- Chemical-resistant or liquid-repellant gloves should be worn. Cloth gloves will absorb sealer.
- Where there is the possibility of skin contact and exposure to sunlight, use a barrier cream formulated for coal tar products or a general purpose barrier cream applied in conjunction with a No. 15 sun lotion. **PM**

Figure 5 Fugitive Emissions Sealed Pavement Monitoring Results

Average airborne concentration compared to OSHA Permissible Exposure Limit (PEL)

