



Department of Pesticide Regulation



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MEMORANDUM

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TO: Sue Edmiston
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HSM-03005

FROM: Harvard R. Fong, CIH
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SUBJECT: Copper Naphthenate Exposure Investigation in Orangevale, Sacramento County

Responding to concerns raised by Dr. Michael O'Malley over a potential copper naphthenate (CuNPH) exposure, Frank Schneider and I initiated an air and surface monitoring study of the home in question. This home is located on Lance Ave. in Orangevale. Dr. O'Malley had reviewed the blood tests of the resident and had determined the resident appeared to have considerably elevated copper levels in her bloodstream. Because the wall studs that had been treated with CuNPH had been sealed over with wallboard and tile, it was difficult to isolate the route of exposure that the resident was experiencing. A site visit by Industrial Hygiene Program (IHP) staff did not disclose any obvious sources of exposure.

According to the resident, earlier in the spring of 2002 she had contracted to have some home improvements made to her house. Part of this project was the remodeling of the bathroom. In the course of the bathroom work, water damage from (according to her) an earlier roof leak was discovered on the interior walls of the bathroom. She contracted an environmental inspection firm, which identified the molds as aspergillus, stachybotris and penicillium. The contaminated wallboard was removed (supposedly enclosed in plastic bags before removal from the bathroom) and the structural studs were treated with copper naphthenate (Jasco Termin-8, EPA Reg # 7424-1-AA). This would appear to be a violation of label requirements, since Jasco is labeled for exterior use only. After the treatment, the resident reported that there was a strong unpleasant odor throughout the house. The contractor allegedly assured her that this was harmless and that he does this type of application all the time. The resident stayed in the house for three days under these conditions (including sleeping and eating) until she could no longer tolerate the odor. She asked the contractor to remove the treated studs. He removed the most heavily treated studs but supposedly left some of the less treated studs in place. Subsequently, the wallboard was placed and the walls painted with what appears to be enamel paint. For all intents and purposes, the remaining contaminated studs are sealed off from any physical contact. There were slight structural defects (mismatched window frame with half-inch gap, still missing kick plates along the floor) but the bathroom walls appear to be finished. Any airborne contaminants would have a very restricted access to the bathroom interior. The resident was advised to continue leaving the bathroom fan on.



There was no noticeable odor of any kind in either the bathroom or in the kitchen or living room to the IHP staff. The resident has been making a point of aerating the house, and the living room and bathroom windows were wide open. The IHP staff asked her to run the heater, and detected no odor other than that associated with a heating system that has been unused for several months (a "dusty" odor). There were no unusual stains on either the bathroom walls or the floor. No conditions that would have suggested exposure to copper naphthenate were noted.

After the first site visit and the subsequent medical records evaluation by Dr. O'Malley, a decision was made to attempt to characterize potential pesticide exposure routes. On September 16th, IHP staff entered the house at 0930 hrs. Ten MSA ELF air-sampling pumps were placed in the following locations: Four in the bathroom; 2 in the kitchen; 2 in the master bedroom; 2 in the outside covered patio. These pumps had all been calibrated the previous week. All pumps were set to run at 1 liter per minute (LPM). For collection of the air contaminants of concern, two different media were used; Anasorb CSC charcoal tubes and silica gel tubes. The charcoal tubes were used to collect any residual hydrocarbon solvents, ingredients in the inerts of the Jasco formulation. The silica gel tubes were for collection of the naphthenic acids, a collection of heterogeneous organic acids used in CuNPH.

Air samples were drawn from the bathroom where the copper naphthenate treatment was made (2 for solvent, 2 for CuNPH); from the master bedroom across the hall from the bathroom (1 solvent, 1 CuNPH); from the kitchen that has an adjoining wall with the treated studs of the bathroom (1 solvent, 1 CuNPH); and from the outside patio (1 solvent, 1 CuNPH). Four swipe samples (12-ply cotton gauze pad moistened with isopropyl alcohol) were also taken, two from the bathroom (on sink counter and on toilet tank) and two from the kitchen (on sink counter and on range counter). Thus a total of five solvent samples, five CuNPH samples and four swipe copper samples were drawn. Table One presents the results of the sampling.

Table One: Analytical Results from Samples Collected in Residence Treated with Copper Naphthenate.

Media	Location	Analysis	Result
Swipe	Top of toilet tank	Copper	< 0.02 $\mu\text{g}/\text{cm}^2$ (MDL)
Swipe	Bathroom counter	Copper	< 0.02 $\mu\text{g}/\text{cm}^2$ (MDL)
Swipe	Kitchen sink counter	Copper	0.089 $\mu\text{g}/\text{cm}^2$
Swipe	Range counter	Copper	0.050 $\mu\text{g}/\text{cm}^2$
Charcoal tube	Outdoors	Solvents	< 34 $\mu\text{g}/\text{m}^3$ (MDL)
Charcoal tube	Master bedroom	Solvents	370 $\mu\text{g}/\text{m}^3$
Charcoal tube	Kitchen	Solvents	360 $\mu\text{g}/\text{m}^3$
Charcoal tube	Bathroom I	Solvents	680 $\mu\text{g}/\text{m}^3$
Charcoal tube	Bathroom II	Solvents	680 $\mu\text{g}/\text{m}^3$

The laboratory was unable to obtain conclusive analytical results for any of the silica gel tubes used to sample naphthenic acids. According to an e-mail from Elaine Wong, the chemist in charge of this project:

We have exhausted all attempts at getting definitive detection of naphthenic acids with the equipment we currently have at the Center. As I had mentioned before, our Chem 3 did some research at UC Davis and found some articles with descriptions of analytical methods and techniques. We do not have the exact configuration of instrumentation that is described in these methods and attempts were made to modify procedures in hopes of getting signals.

By employing several methods and chemical techniques, no definitive data was collected. The naphthenic acids are large multi-component organic acids and do not chromatograph well.

Two chemists have worked on this project now without success. I apologize for the length of time it has taken for us to reach this point. I wanted to make sure that all possibilities had been investigated.

Thus I can make no estimation or offer any particular interpretation as to the potential airborne exposure of the resident to naphthenic acids.

The solvent levels reported by the laboratory do not appear to be of major concern. The U.S. Environmental Protection Agency's Introduction to Indoor Air Quality: A Reference Manual, has some information on levels of Volatile Organic Compounds (VOC) associated with indoor air, though most of the concern appears to be with formaldehydes, aromatic hydrocarbons and chlorinated hydrocarbons. The most applicable information appears to indicate that the range of n-alkanes levels in offices is between 8 and 1700 $\mu\text{g}/\text{m}^3$ and that levels of hexane have been found in homes to vary from 5 to 69 $\mu\text{g}/\text{m}^3$. However, the lower value for hexane represents only one of the multiple species in the reported solvent values.

The copper residue on the kitchen surfaces, and the lack of corresponding residue in the bathroom, provide inconclusive evidence for copper naphthenate contamination. The kitchen residue of copper, like the solvent residue in the air, may be associated with other consumer goods (copper clad cookware, wiring, water pipes, coinage, etc.). The lack of copper in the bathroom may be from previous cleaning efforts, though this is not known.

Recommendations:

It is impossible to ascertain if the pesticide copper naphthenate, or its component ingredients, were present in the air or on the surfaces of the tested house at levels that could have resulted in illness to the resident. Aside from the analytical difficulties, the span of time between the application and the sampling makes establishing initial contamination levels problematic. Research into other sources of potential agents may be necessary to rule out residential environmental causes. DPR's investigation into pesticide-related causes is inconclusive and will not be investigated further.