

DEPARTMENT OF PESTICIDE REGULATION

James W. Wells, *Director*

1020 N Street
Sacramento, California 95814

HSM-94009

[#assigned after initial issuance of letter]

June 8, 1994

Bob De Forge
878 Dorothy Street
Chula Vista, CA 91911

Dear Mr. De Forge:

This letter is in response to your request for our evaluation of the results of the air monitoring conducted at your home. Below I have detailed briefly what occurred, the sampling procedure and results of the sample analysis, and our evaluation of the results.

Summary of Problem

An application of a copper naphthenate product was made by you to the wood in the crawl space of your home. The product was applied in January of this year. You were concerned that a possible over-application may have occurred due to a label misinterpretation. The application has resulted in a continuing offensive odor problem within the living area of the house that has caused illness within your family and, eventually, forced you to move out of this house.

Air sampling and Results of Analysis

To determine the magnitude of the odors and relation to any hazard to you or your family, air sampling was planned and conducted. Air samples of the air within the house and the crawlspace were collected by personnel of the San Diego County Health Department beginning on March 30. Two 24-hour air samples were obtained. For each of these samples, air was drawn through a charcoal sorbent tube in series with a silica gel sorbent tube. Air from the living area (Sample AG-1) and air from the crawlspace (Sample AG-2) was drawn through the two-tube sampling media at a sampling rate of about 3 liters of air per minute for the 24-hour period. Any naphthenic acid or mineral spirits in the air was captured by the sorbent tubes. At the end of the 24-hour sampling period, the tubes were collected, capped and sent to the Agriculture and Priority Pollutants Laboratory (APPL) in Fresno for analysis. In the laboratory, each sample tube was extracted and the extracts pooled for each sample for subsequent



analysis by gas chromatography. The analysis quantitated the total amount of naphthenic acid and mineral spirits. With the quantity measured for each sample determined, the air concentration present during the sampling period was calculated by consideration of the amount of air drawn through the sorbent media. Details of the sampling, analysis, and resulting calculation of the airborne concentrations are listed below:

Airborne Concentration of Naphthenic Acid

Sample #	Location	Air Sampled (liters)	Lab Result (ug/sample)	Air Conc. (ug/L)
AG1	In House	4676	1122	0.24
AG2	Crawl Space	4670	1588	0.34

Airborne Concentration of Mineral Spirits

Sample	Location	Air Sampled (liters)	Lab Result (ug/sample)	Air Conc. (ug/L)
AG1	In House	4676	2291	0.49
AG2	Crawl Space	4670	6911	1.48

Evaluation of Health Risk for Naphthenic Acid

Naphthenic acid is not a single compound, but a mixture of various organic acids. most organic acids exhibit low vapor pressures (not very volatile) and consequently will not exist in the air in high vapor concentrations. However, even at low air concentrations, most of these acids are noticeable due to their inherent low or very low **odor thresholds**. In addition, the characteristic odors of most of these acids are typically very disagreeable. The low odor thresholds and obnoxious nature of the odors indicate they can be the source of foul odors at airborne concentrations typically below health considerations. Also, due to the low vapor pressures, the odor may persist for long periods of time as various components slowly vaporize and enter the air.

Listed below are some organic acids typically found in naphthenic acid, the odor thresholds, a description of the nature of the odor, and an existing health guideline value for reference.

Organic Acid	Odor* Threshold (ug/L)	Odor* Description	Irritation Concentration (ug/L)	Exposure** Guideline
Methanoic (formic)	0.045	pungent, penetrating	27	5 ppm 9 ug/L)
Ethanoic (acetic)	2.500	sour, vinegar-like	25	10 ppm. 25 ug/L)
Propanoic (propionic)	0.084	sour		10 ppm 30 ug/L)
Butanoic (butyric)	0.001	sour, perspiration		none
Iso- pentanoic	0.021	goaty		none
2-Methyl butanoic	0.053	body odor		none
Pentanoic (valeric)	0.002			none
Decanoic (capric)	0.002			none

* Odor Thresholds and Irritation Levels of Several Chemical Substances: A Review, Jon Ruth, Am. Ind. Hyg. Assoc. J. (47), March, 1986.

** For reference - Threshold Limit Values (TLV^R) of the American Conference of Governmental Industrial Hygienists (ACGIH). Although strictly applicable only to occupational exposure, most of the guideline levels for these acids were set to prevent eye and respiratory irritation.

If you compare the odor thresholds of some of the above to the measured airborne concentration measured in your house, it is clear the sampling confirmed what you already knew; there are (or were) airborne odoriferous compounds present. For example, if you compare the odor threshold ranges for some of the acids above with what was measured in your house, the house level would be many times the individual odor threshold for many of the listed organic acids. Naphthenic acid may contain many more acids than I have listed above. The ones above are those for which I have some physical data. However, remember the samples measured the total naphthenic acid concentration and individual acids were not determined.

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With regard to whether the measured levels of naphthenic acid pose a health threat, although above odor thresholds, the levels measured did not approach levels listed in the literature for irritation of some of the more volatile acids (see above table). Consequently, it would appear the measured total naphthenic acid level would not pose a health threat, at least at this point in time. However, what was measured on March 30, 1994, was probably less than what you and your family initially experienced. The characteristics of some of these odors might be sufficient to cause considerable discomfort.

Evaluation of Health Risk from Mineral spirits

The mineral spirits concentration measured is considerably less than any recognized occupational exposure limit and should not pose a problem. The most conservative recommendation for exposure to Stoddard solvent (similar to mineral spirits) is the American Conference of Governmental Hygienist's (ACGIH) Threshold Limit Value (TLV^R) of 525 mg/m³ (equivalent to 525 µg/L), measured as an eight-hour time-weighted average concentration. The concentration measured in your house (0.49 µg/L) was much less than the above.

In conclusion, it appears the unfortunate application resulted in residual obnoxious airborne levels of the naphthenic acid components in your house. Airborne levels remaining at this time probably do not pose a health threat.

I hope the above has answered your questions. Please contact me if I can be of further assistance.

Sincerely,

Dennis B. Gibbons

Dennis B. Gibbons, CIH
Senior Industrial Hygienist
916) 445-4270

cc: John Donahue, DPR
John Ross, DPR
Michael O'Malley, DPR
Chuck Andrews, DPR
Ricardo Martinez, DPR
John Blocker, San Diego CAC
Dan Tappan, San Diego Health Dept