Department of Pesticide Regulation

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MEMORANDUM

TO: Susan Edmiston **HSM-06014**
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FROM: Harvard R. Fong, CIH *(original signed by H. Fong)*
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SUBJECT: RESULTS FROM AIR MONITORING OF STRAWBERRY FUMIGATION FACILITY IN VENTURA COUNTY

On June 21, Associate Industrial Hygienist, Frank Schneider, traveled to Oxnard, Ventura County to observe an air monitoring study of the fumigation procedure of a strawberry processing facility. This strawberry processing facility is located on East Hueneme Road in Oxnard. The fumigation structures consist of two intermodal-type chambers (approximate volume of 2,400 ft^3) set end to end with the control room located between them. This facility engaged an industrial hygiene firm to conduct an industrial hygiene assessment of their fumigation procedures. This is allowed under the Suggested Permit Conditions/Methyl Bromide Commodity Fumigation of August 1994 ("Permit Conditions") in order to discontinue colorimetric tube monitoring required under the Permit Conditions.

The industrial hygienist, Lev Michaelian CIH, consulted with Worker Health and Safety (WHS) before conducting his assessment. I met with him at the facility in October to discuss the appropriate sampling methodology necessary to ensure that WHS could make an assessment of the potential worker exposure to methyl bromide during the application and processing cycle. The berries being fumigated are for export and are very time sensitive, with the time from harvest to loading onto an international flight running about sixteen hours. This time sensitivity had resulted in the issuance of a variance to the Permit Conditions, "Alternative Condition 14", which allowed a two-hour aeration (as opposed to four hour) and required colorimetric tube testing every 30 minutes. The Permit Conditions are designed to provide exposure below Department of Pesticide Regulation (DPR) Guideline Value of 0.630 part per million (ppm) over 8 hours (with adjustment for time/concentration as necessary, i.e. 4 hours exposure at 1.25 ppm; 2 hours of exposure allowed at 2.5 ppm and 1 hour of exposure allowed at 5 ppm).

The strawberry processing facility ran two separate fumigations, one using a two-hour aeration and the other using a four-hour aeration. Both chambers were run during each fumigation test, and were loaded with 18 pallets of strawberries each. One pallet holds approximately 1,300 lb of berries. Each chamber was treated with 7.5 pounds of methyl bromide. In both tests (T1 and T2) berries were fumigated for 3 hours. In T1, the chambers were then aerated for 2 hours, in T2 the

aeration lasted 4 hours. After the appropriate aeration, the berries were forklifted into the cooler and positioned in front of cold-air inlets, ultimately forming a tunnel of pallets. A heavy tarp was draped over the tunnel formed by the two rows of pallets, forcing the cold air outside of the pallets through the pallets. Four tunnel/pallet combinations were formed, two from T1 and two from T2. After cooling for 1.5 to 2 hours, the tunnels were disassembled and the pallets forklifted into an adjoining processing area where the pallets are reorganized for shipping. From there the finalized pallets are forklifted toTectrol packaging, where they are covered in an airtight plastic shroud (sleeving), the air within the covered pallet is vacuumed out and replaced with carbon dioxide, to prolong freshness. The berries then move directly to a waiting truck and are driven to air transportation for overseas shipping.

A summary of the two tests in shown in Table One.

Table One: Fumigation Test Results

	Methyl Bromide Concentration/Sampling Period	
Location	**Test One (2 hour aeration)**	**Test Two (4 hour aeration)**
Control Room	<0.045 ppm/238 minutes	0.12 ppm/258 minutes
Forklifter I*	<0.12 ppm/32 minutes	<0.07 ppm/34 minutes
Forklifter II*	<0.08 ppm/30 minutes	<0.072 ppm/34 minutes
Cooler I**	5.4 ppm/131 minutes	1.2 ppm/82 minutes
Cooler II**	No sample	1.2 ppm/80 minutes
Repalletizing	0.84 ppm/284 minutes	0.46 ppm/72 minutes
Packaging I**	1.2 ppm/30 minutes	0.48 ppm/30 minutes
Packaging II**	0.94 ppm/30 minutes	0.48 ppm/30 minutes

* Two separate forklift operators **Simultaneous samples taken in same general area.

Though not 8-hour time-weighted averages (TWA), the 2-hour aeration values do not compare favorably to the DPR Guideline Value for methyl bromide of 0.630 ppm. These values do not support discontinuing colorimetric tube sampling and could potentially require the imposition of formal work-hour restrictions to employees potentially exposed to these concentrations. Most alarming is the cooler sample of T1. An air sample of 5.4 ppm for 131 minutes calculates to a Time Weighted Average (TWA) of 1.47 ppm, above both the DPR Guideline Value and the Cal/OSHA Permissible Exposure Limit (PEL) of 1 ppm (see calculation below).

$$\left([(131 \text{ minutes}) \times (5.4 \text{ ppm})] + [(349 \text{ minutes}) \times (0 \text{ ppm})]\right) \div 480 \text{ minutes} = 1.47 \text{ ppm TWA}$$

This concentration is unacceptable to DPR. Regardless of the air concentrations found in the other locations (some of which also exceed the target value of 0.630 ppm), the level found in the cooler prohibits the use of a two-hour aeration time unless further mitigation measures are instituted. Exhaust ventilation of the cooler may result in an acceptable concentration, but is

probably not a viable method for reducing airborne methyl bromide. It should be noted that the cooler and the structure where repalletizing/packaging occurred did not appear to have any exhaust ventilation system. Only passive aeration (diffusion) through loading dock doors and entrance doors could occur in these structures. Even if the level in the cooler could be reduced, further ventilation of the repalletizing and packaging areas may also be necessary to bring the measured concentrations below 0.630 ppm.

Longer sampling times may indicate that the TWA for the repalletizing and packaging areas is below the 0.630 ppm and that passive ventilation may be adequate for these areas. However, the unacceptable cooler result may make such further measurements moot.

In summary, the data presented by the strawberry processing facility does not support discontinuance of air monitoring as required under “Alternative Condition 14”. Furthermore, when a 2-hour aeration is conducted, concentrations in the cooler do not meet DPR’s guideline values and may also exceed Cal/OSHA’s PEL for methyl bromide.

cc: Charles M. Andrews, Chief, Worker Health and Safety Branch
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