



Department of Pesticide Regulation



Paul Helliher
Director

Gray Davis
Governor
Winston H. Hickox
Secretary, California
Environmental
Protection Agency

October 23, 2003

HSM-03029
(No. assigned after issuance of memo)

Theodore Davis
Kern County Agricultural Commissioner
1001 South Mt. Vernon Ave.
Bakersfield, California 93307

Dear Mr. Davis:

On September 25th, I visited the Pacific Almond facility in Lost Hills. Mario Ibarra from the Central Regional Office of the Department of Pesticide Regulation's (DPR) Enforcement Branch requested this visit. Mr. Ibarra was concerned over operations at the facility involving the use of ECO2FUME (EPA Registration Number 68387-7), a gaseous pesticide containing both phosphine (2%) and carbon dioxide (98%). According to Mr. Ibarra, staff from your office had inspected the facility previously that week and had issued a work stoppage order for fumigations within the storage facility. Mr. Ibarra requested the Worker Health and Safety (WHS) Branch's Industrial Hygiene Program to provide on-site consultation to review facility operations, fumigant uses, and potential exposure mitigation measures.

I initially met with Mr. Ibarra to review the available label/application manual for ECO2FUME. The application method implemented by Pacific Almond does not appear to be specifically listed in the manual. According to Mr. Ibarra, it appears that Pacific Almond was selecting various parts of the listed procedures (Application to Bulk Containers; Application to Tarpaulin Fumigations) and developing an *ad hoc* application procedure for their bin fumigations. There were concerns that this procedure would result in unacceptable worker exposure to phosphine gas, both during the application and during subsequent off-gassing/aeration within the storage facility.

After conferring with Mr. Ibarra, we arrived at the Pacific Almond facility and were met by Mr. Ferguson of Pacific Almond, Ed Hosoda of Cardinal Chemical, and Gene Beach of the Almond Hullers and Processors Association. Mr. Ibarra explained to them the concerns that the Kern County Agricultural Commissioner and DPR had with their use of ECO2FUME. I informed them that my responsibility was to perform a walk-through of the facility, observe the activities of concern, assess potential exposure mitigation procedures previously implemented, and make recommendations as to further mitigation procedures, if necessary.

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We walked through the various areas of the facility, including the office, grading room (an enclosed structure within the larger warehouse), boxing machine, and main storage area. We also viewed the outdoor location presently used as the fumigant injection site. Also at the injection site were bins that were previously fumigated, but as required by county order, they are currently stored outside of the warehouse.

I determined, in consultation with the Enforcement Branch, that Title 3 California Code of Regulations (CCR) section 6782 is applicable when ECO2FUME is used at the Pacific Almond facility work site. Under CCR section 6782(d), employees are not allowed to enter fumigated enclosed areas, except to determine the fumigant concentration of facilitate the aeration process, unless the concentration in the area is known to be at or below the Permissible Exposure Limit (PEL) or more stringent requirements specified on the product label. Enclosed spaces include areas where tarpaulin-covered commodities are stored. CCR section 6782(e) states that the fumigant shall not be released into an occupied work area. Section 6782(f) states that after completion of the fumigation, the treated area or products shall be managed so that employees entering the area or working with the treated products are not exposed to a concentration in excess of the PEL or more stringent label standards.

On review of the regulations, label and the Application Manual, the use directions on the label and Application Manual appear to lack specificity in its recommendations on the use of air monitoring devices to ensure worker safety. Although a certain amount of generalization and lack of detail may be necessary to allow for variances in facilities and uses, the monitoring protocols offered on the label and Application Manual are inadequate for potential use by persons unfamiliar with appropriate air monitoring procedures. After examining the facility and reviewing the label and Application Manual, I developed the following preliminary recommendations and observations to provide clarity and guidance to labeling directions and any monitoring necessary to comply with CCR section 6782:

1. Injection application of the ECO2FUME may be allowed to temporarily continue within the confines of the warehouse structure if the following conditions are met:
 - a. Initial injections within the warehouse occur immediately adjacent to a fully opened roll-up door.
 - b. At least one of the injection handlers must be wearing a continuous monitoring phosphine detector equipped with an audible alarm triggered at 0.3 PPM phosphine (the Cal/OSHA Permissible Exposure Limit; PEL). The handler wearing the detector should be the one spending the greatest amount of time involved in and around the injection process. The sampling device should draw air from the operator's (applicator's) breathing zone (OBZ). Shirt pocket level is acceptable.

- c. Subsequent re-application injections to bins already located within the warehouse should require not only a detector on the handler but also detectors stationed within close proximity of the fumigated bins for at least 1 hour after the final bin application. If treated bins are widely scattered (more than one aisle over), additional detectors may be necessary. Any use of a forklift to elevate handlers to perform bin injection shall comply with Cal/OSHA Title 8, section 3657: Elevating Employees with Lift Trucks. The cylinder crib holding the fumigant tanks shall not be lifted higher than necessary (less than 1 foot) to move it via forklift as per Title 8, section 3650 (s)(15): *The forks shall always be carried as low as possible, consistent with safe operations.* Raising the cylinder crib higher than 1 foot to facilitate application is prohibited.
 - d. Application does not violate any specific requirements on either the label or the application manual.
 - e. At all times during the injection activity, the phosphine detector is to be activated and functioning properly. Readings of handler monitors should be recorded on a permanent record form, primarily starting and ending readings. Hourly readings of area monitors should also be recorded on a permanent record form. All “zeros” should be noted as less than the minimum detectable level. Any excursions above the minimum detectable level should be noted. Excursions below the PEL should be investigated and explained. Excursions above the PEL must trigger the emergency response plan, including employee evacuation from the warehouse and adjoining structures.
2. Fumigated bins may be temporarily stored within the warehouse under the following conditions:
- a. At least one detector (separate from those required for handler monitoring and freshly fumigated bin monitoring) must be located at the boxing machine (next to grading room). This detector must be in operation any time workers are present within the warehouse (including the grading room and office). This detector must be placed such that air may flow around its sensor unimpeded (i.e. not against a wall) and at roughly the height corresponding to an OBZ (1.5 meters).
 - b. At least one detector (separate from those required for handler monitoring and freshly fumigated bin monitoring) should also be located in the bin storage area on the west side of the warehouse. This detector must be in operation any time workers are present within the warehouse (including the grading room). This detector should be moved around the storage area on an hourly basis while

workers are present in the warehouse (including grading room). Locations are at the discretion of the facility operator, but should not be within 3 meters of open roll-up doors or other exterior access points, nor should they be in areas in which the latest bin fumigation was greater than 7 days earlier. Additionally, as previously required, this detector must be placed such that air may flow around its sensor unimpeded (i.e. not against a wall) and at roughly the height corresponding to an OBZ (1.5 meters).

- c. All detector use may cease 7 days after the last bin fumigation. Any introduction of freshly fumigated bins or re-injection of bins resets this time period.
- d. Hourly readings of area monitors should be recorded on a permanent record form. Any excursions above the minimum detectable level should be noted. Excursions below the PEL should be investigated and explained. Excursions above the PEL must trigger the emergency response plan, including employee evacuation from the warehouse and adjoining structures.

These recommendations are for the facility as presented. Modifications to the facility, including addition of sufficient forced-air ventilation, instillation of a fixed and dedicated phosphine monitoring system, or specific label requirements addressing bin injection procedures, may necessarily revise these recommendations.

Furthermore, as specified in CCR section 6780 (c), a Fumigation Safety Program may be required. The emergency response plan presented by Pacific Almond is somewhat deficient in its coverage of accidents involving either the application equipment/procedures or events involving fumigated product.

Though it may not be possible to eliminate the need for detectors on handlers, engineering modifications may be sufficient to ensure worker protection from bin off-gassing or fugitive emissions from plastic liner damage. Leakage from damaged liners is of special concern, since tears or other compromises in the liner may not be visible, yet still allow a rapid escape of injected phosphine. More data on diffusion and off-gassing is necessary to develop a more generic set of standards for ensuring worker safety during and after application of ECO2FUME in this type of setting.

Theodore Davis, Kern CAC
October 23, 2003
Page 5

We will keep you informed of further developments concerning this use of ECO2FUME regarding worker exposure. If you have any questions concerning these issues, please feel free to contact me at the number listed below.

Sincerely,

[original signed by H. Fong]

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Senior Industrial Hygienist
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cc: Chuck Andrews, Chief, WHS Branch
Scott Paulsen, Chief, Enforcement Branch
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