September 3, 2004

Kevin Gonzalves  
Deputy Commissioner  
Stanislaus County Agricultural Commissioner  
3800 Cornucopia Way, Suite B  
Modesto, CA 95358

Dear Mr. Gonzalves:

On August 18, both Frank Schneider and I accompanied you and your staff to the processing facility of the Montpelier Nut Company of Modesto. This was done in response to your request for an industrial hygiene assessment of the phosphine use at this facility. Our assessment of the facility is as follows:

1. The first storage building we entered (west storage) had detectable levels of phosphine gas within the structure. This was ascertained by our INNOVA-ST Multi-Gas Monitor. Thermo Electron Corporation. The general air space concentration of phosphine reported by the INNOVA averaged around 0.1 to 0.15 ppm. The suspected source of the phosphine gas was the approximately 200 bins of treated nuts within the storage facility. Though these bins had supposedly been treated the previous week, we also detected phosphine gas (0.27 to 0.37 ppm) in the immediate airspace over the bins. This would suggest that the bins are a source of the phosphine gas within the storage facility. It was not possible to ascertain the actual route of the phosphine emissions from the bins (insufficiently tightened bag opening; gas permeation through the plastic bag; integrity failure of the bag) using the INNOVA.

We did not detect any gas concentration exceeding the Permissible Exposure Level (PEL) of 0.3 ppm for phosphine gas in the general air parcel of the storage facility. However, general practice of industrial hygiene would suggest that further monitoring of this facility be conducted.

As Cal/OSHA notes in its regulation concerning airborne contaminates, “Because of some variation in individual susceptibility, an occasional worker may suffer discomfort, aggravation of a pre-existing condition, or occupational disease upon exposure to concentrations even below the values specified in these tables. The exposure limits established by this section reflect current medical opinion and industrial hygiene practice, doubts being resolved on the side of safety, and are intended to be used in accordance with good industrial hygiene practice by qualified persons (emphasis added).” This suggests that the structure may require further monitoring, ideally constant real-time monitoring, for the duration of fumigated product storage. It is strongly advised that either a real-time stationary phosphine-monitoring system be installed; or an exhaust ventilation...
protocol/system be installed to remove fugitive emissions of phosphine; or that all employees entering the structure be equipped with a personal real-time phosphine detector. Other mitigation measures may also be applicable.

2. In the second storage structure we entered (cold storage), the INNOVA did not detect any phosphine (minimum detectable level 0.1 ppm). There were few bins present and these were supposedly product that had been treated last year. If phosphine-emitting bins are placed into this area, the mitigation requirements listed in Point One may be applicable.

3. In the storage building closest to the road (east storage), the INNOVA detected phosphine gas at 0.13 ppm. The two tarpaulin fumigations apparently in process in that area were the most likely source of the phosphine gas. Interestingly, neither the apparently active fumigations in this storage area, nor the fumigated product in west storage, had any posting as to their fumigation status. It also appeared that the tarpaulin fumigation of product within an enclosed area might trigger Sections 6780 and 6782 requirements. Indeed, the injection fumigation of bins within an enclose structure may also trigger such requirements. Once again, the mitigation procedures/modifications listed in Point One may likely be required.

4. The two intermodal containers used as fumigation chambers (located next to the loading dock for the east storage) appear to have serious leaks. In the breezeway between the containers and the east storage wall, elevated levels (>0.3 ppm) were found at the breathing zone height, and a reading of 1.95 ppm was found in the “crawlspace” under the container. This would strongly suggest that the chamber has a failure of container integrity. We would suggest this be immediately investigated and repaired and that the chamber be removed from use until this is accomplished. Additionally, a barrier or placard prohibiting employee transit through this area during fumigation should be utilized. No phosphine detected at the canvas doors.

5. In the pit of the loading dock, next to the intermodal container chambers, the INNOVA displayed levels from 0.1 to 0.4 ppm, and momentarily peaked at 1.0 ppm. This may be related to the leakage problem previously mentioned in Point Four. Prohibition of workers in the pit area (though not on the dock itself) is advised until the source of the phosphine gas has been established and mitigated.

6. The cylinder storage area is of exceptional design and should be used as a model for other phosphine users to follow for storage of fumigant gasses. The cylinders all appear to be properly strapped, there is free flow of air through the storage area, proper attention has been paid to securing the area and excellent housekeeping is being practiced.

7. A real-time personal phosphine-monitoring device does absolutely no good stored in a desk drawer. The unit should be deployed in conditions where phosphine levels may be
unknown (storage) or under conditions where concentrations may change rapidly (application). If workers are required to enter storage facilities where phosphine levels are in flux (for example, adding freshly fumigated bins to a storage facility that had been previously tested), and there are no engineering controls or administrative protocols to ensure compliance with the PEL/label, personal monitors, as specified in the Application Manual, must be utilized by all workers entering the structure.

Since phosphine gas, in the form of the ECO2FUME formulation, appears to be a methyl bromide replacement, it is critical that the use of this material be properly reviewed and that facilities using it sample and document air concentrations in the workplace. It would appear that this nut processing plant was not fully aware of appropriate safety requirements for the use of phosphine gas. However, mitigation of the exposure conditions should not be an unreasonable task. The primary mitigation measure should be adequate ventilation of storage facilities. By the use of either forced air general ventilation, or whole-structure exhaust ventilation, the levels of phosphine within the structures could be kept below levels of concern or even to undetectable levels. This would be the preferred method of control. Consultation with a ventilation engineer is advised if this is pursued. Simply slapping fans about the structures would probably prove inadequate and a waste of time and capital. I am willing to discuss these recommendations with a consultant.

Other approaches to risk reduction could include pole-barn storage of treated bins (avoiding confinement of off-gassing phosphine), equipping storage areas with real-time phosphine detectors which log their data to a central control consol and constantly monitor phosphine concentrations within the structure, and conducting all applications outside to allow for dilution of any fugitive emissions during gas injection.

We look forward to providing further assistance for any other situations in which you may need to consult on. If you have any questions or concern, please contact me at the number listed below.

Sincerely,

(Original signed by H. Fong)

Harvard R. Fong, CIH
Senior Industrial Hygienist
Worker Health and Safety Branch
(916) 445-4211

cc: Susan Wilson, Enforcement Branch