Department of Pesticide Regulation

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M E M O R A N D U M

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SUBJECT: RESULTS OF A SURVEY OF SMALL PLANET FOODS PACKING FACILITY CONDUCTED IN RESPONSE TO CHLORINE DIOXIDE ILLNESSES

On December 9, I met with Milford Esau of the Merced County Agricultural Commissioner's (CAC) office. I was there to provide on-site consultative services concerning a pesticide illness event at the Small Planet Foods (SPF) Atwater packing facility. In the early morning of August 23, 2002, four employees of the packing facility complained of an irritating odor, which they identified as chlorine. These employees were transported to medical treatment. This episode triggered an investigation by the Merced CAC, which contacted Worker Health and Safety Branch for further assistance in the investigation.

On arrival to the packing facility, Mr. Esau and I met with Mr. Effinger, the Safety and Regulatory Manager of the facility. He took us to the location where the illness event occurred. The event involved three persons within the enclosed structure and one person outside the building. The first location we visited was the outside site. At this location there were two large, square open-top tanks. These were flume water collection tanks, where flume water collects for recirculation into the system. This is also where chlorine dioxide is injected into the water. Fresh water is added to the system as needed. According to Mr. Effinger, during active flume operation, a small amount of chlorine dioxide is constantly injected into the water at these tanks. The control panel for this injection is located directly above these tanks. Normally, the chlorine dioxide levels are monitored on an hourly basis using some kind of titration/colorimetric test, not unlike that used for swimming pools. The results from the test are recorded and, if necessary, an additional measure of chlorine dioxide can be added, using the control panel. However, the controls are supposedly designed so that only a limited amount of additional chlorine dioxide can be added per time period, to prevent accidental injection of a large bolus of material. The controls are apparently designed to allow only incremental adjustment of chlorine dioxide levels.

A second chlorine-monitoring device makes use of a probe in the flume waterway. This device is an ORP (oxidation reduction potential) probe. According to information provided by YSI Environmental, the determination of ORP is particularly worthwhile in water that contains a relatively high concentration of a redox-active species, e.g., the salts of many metals (Fe2+, Fe3+) and strong oxidizing (chlorine) and reducing (sulfite ion) agents. Thus, ORP can be

utilized to determine the chlorine content of water. However, ORP is a nonspecific measurement, i.e., the measured potential is reflective of a combination of the effects of all the dissolved species in the medium. Because of this factor, the measurement of ORP in relatively clean water has only limited utility unless a predominant redox-active species (as is the added chlorine dioxide) is known to be present. Information from the ORP probe is also used to assess the chlorine levels in the flume water. I was not able to view the probe since it had been removed for service.

On the morning of the illness event, the hourly colorimetric test taken at 1:35 AM from the flume water collection tanks showed a chlorine dioxide level of 0.6 ppm. According to the information on this data sheet, normal chlorine dioxide is between 0.2 and 0.4 ppm. The tests from the previous 5 hours were also either 0.6 or 0.5 ppm. After the 1:35 AM test, there is not another test result until 3:00 AM. The reason given for the missed test (scheduled for 2:00 AM, according to the results sheet) was that the employee was taking their meal break and had neglected to make arrangements for the scheduled sampling. On taking the 3:00 AM sampling, the test results indicated chlorine dioxide levels of 7.0 ppm, over ten times the previous reading. The results of the test taken the following hour, at 4:00 AM, were also 7.0 ppm. The next test, at 5:30 AM, showed the levels dropped back to 0.3 ppm. The elevated levels should have triggered intervention by a qualified person to monitor and adjust the chlorine dioxide injection. It was not clear if this was done, though there is a notation on the colorimetric test data sheet, at the time of the first high reading at 3:00 AM, to "turn it off." No other such notation is shown either before that time or after.

The illness events were contemporaneous with the rise in chlorine dioxide levels. The illness occurred at the dewatering station (2 persons affected), the catwalk above and to the left of the dewatering station (1 person) and out by the collection tanks (1 person). The dewatering station and the associated catwalk share the same general airspace within the structure, whereas the collection tanks are outside the building. This facility had been the site of previous illnesses associated with chlorine dioxide exposure, both in 1995 and 1998, though it is unclear if the same areas as this event were involved. An emergency medical technician who was part of the emergency response supposedly tested the air with a colorimetric indicator tube and did not detect any chlorine dioxide in the air. The exact time of the air test is not known, but it was sometime after their arrival, approximately 3:00 AM. However, as much as 30 minutes may have passed between the detection of the illness trigger event and the collection of the sample. Transient air levels of chlorine may have already dissipated by the sampling.

It is unclear as to the cause of the high chlorine dioxide reading. The safety managers at SPF did not have any explanation as to the cause. The person in charge of the water treatment chemicals, Don English, was contacted a week after the meeting at SPF and was also at a loss to explain the incident. According to the label provided by Merced CAC, the elevation of the chlorine dioxide levels to 7 ppm is not supported by the label, which specifies a maximum level of 5 ppm in

flume transport water. In a copy of the narrative from one of the previous illness events (1995), it was stated that when flume water concentrations reach 1.5 ppm, the odor of chlorine becomes noticeable. It would thus be expected that a flume water concentration of 7.0 ppm would result in a strong odor.

There were no obvious conditions that could be adjusted so that this type of illness event would be precluded. However, certain steps can be taken to reduce the chance of a re-occurrence of this specific set of circumstances.

Recommendations:

1. Increase the frequency of chlorine monitoring in the flume water collection tank. Hourly may be inadequate for monitoring fluctuating chlorine dioxide levels, especially under conditions of heavy loading of organic material. Develop and implement procedures for responding to variations in chlorine levels. Theses should include not only notification of qualified persons to make adjustments, but also pro-active responses for line workers (such as temporary evacuation) and dramatically increased sampling frequency as chlorine levels escalate and reduce, until conditions return to normal. The posting of the response procedures appropriate to the test results should be at the sampling site. Sampling personnel should be trained in appropriate response and notification procedures.

2. Consider the addition of local exhaust ventilation in areas where flume water agitation is experienced (i.e. dewatering area).

3. Increase general ventilation. The placement of standing fans may provide immediate relief to persons standing in their airflow, but appear to be insufficient for providing adequate air exchange within the processing structure. Inasmuch as the structure does not appear to be an air-conditioned facility, the incorporation of large air movers, providing both cross-structure ventilation, and introducing fresh air, should not difficult to accomplish. It is strongly recommended that a ventilation engineering firm be contacted to provide guidance for correctly increasing facility ventilation and air exchanges.

4. Increase the number of ORP probes to provide accurate and immediate information on chlorine dioxide levels.

cc: Fresno Enforcement District Office
Mr. Michael J. Tanner, Merced CAC