TO: Susan Edmiston, Agriculture Program Supervisor III
Worker Health and Safety Branch

FROM: Janet Spencer, Sr. Environmental Research Scientist
Worker Health and Safety Branch (original signed by J. Spencer)
(916) 445-4198

DATE: February 25, 2006

SUBJECT: WHS BRANCH ACTIVITIES AND RESULTS OF ANALYSES RELATED TO PRIORITY INVESTIGATION 15-KER-05 (PROJECT 0503)

On May 12, 2005 at approximately 7:30 AM, 27 vineyard workers became sickened when exposed to drift from pesticides being applied by ground rig to an adjacent orange grove. The oranges were being treated with a tank mix of Baythroid® 2 (25% cyfluthrin, a pyrethroid insecticide, Bayer CropScience, U.S. Environmental Protection Agency (U.S.EPA) registration number 264-745), Success® (22.8% spinosad, a fermentation-derived actinomycete; Dow AgroSciences LLC, U.S. EPA registration number 62719-292) and 415 Supreme Spray Oil® (Britz, U.S. EPA registration number 10951-15).

Twenty-three female workers were pulling leaves when they saw the application taking place. Four male employees, performing other field tasks, were also in the area. Some workers noticed a pesticide odor. The 27 workers experienced a variety of illness symptoms, including dermal paresthesias, sneezing, rhinitis, sore throat, wheezing, asthma, shortness of breath, abdominal pain, nausea, diarrhea and headache. The female workers were transported to Kern Medical Center where they were decontaminated, examined, treated, and released. Three ambulance personnel who transported workers to the hospital complained of headache, sought medical treatment, and were treated and released at Bakersfield area hospitals. Three firemen who responded were also examined as a precaution, though they did not report experiencing illness symptoms. All field workers reported to work the following day, May 13, but 12 went home still suffering with headaches. The four male field workers did not report their symptoms until May 13, whereupon they were examined and released from Kern Medical Center. Some field workers continued to experience residual symptoms of headache, dizziness, and nausea and sought follow-up treatment during the following 8 days.

Kern County Agricultural Commissioner (CAC) staff and Department of Pesticide Regulation (DPR) Central Regional Office (CRO) staff responded to the incident on May 12 and contacted the Worker Health and Safety (WHS) Branch. WHS authorized the collection and analysis of dislodgeable foliar residue (DFR) and clothing samples for our
exposure investigation. CAC and CRO staff collected one composite dislodgeable foliar residue (DFR) sample along a gradient in the vineyard, from the rows where the workers were pulling leaves when they became ill. Two of the workers submitted clothing samples (two baseball caps, one sweatshirt). In addition, four sharkskin paper swabs were taken from surfaces inside the ambulance.

Since matrix interferences often hinder analysis of multiple pesticides, residue analyses must usually be prioritized. Because the respiratory irritation symptoms were consistent with those reported in previous cyfluthrin illness investigations, as well those reported in the literature for cyfluthrin and other alpha-cyano pyrethroids, the analytical priority was to evaluate cyfluthrin residues (1, 2). Analyses for spinosad were secondary in priority, and conducted as feasible. Sample results are presented in Table 1; laboratory quality control (QC) results are presented in Table 2.

All samples were reported as not detected for both cyfluthrin and spinosad. Laboratory QC showed acceptable recoveries for all cyfluthrin samples. Swab samples had acceptable recoveries for all three pesticides. Spinosad had very poor recoveries from the DFR samples; this has been observed in previous investigations of spinosad (3). Clothing analyses are typically associated with high limits of quantification (LOQ) because fabric attributes such as dyes and mixed fiber content often create analytical interferences, as compared to swab and DFR samples. The laboratory QC for clothing was thus conducted at "overspike" levels to accommodate these sources of potential interference and uncertainty. QC results for clothing varied widely: cyfluthrin was detected, but residues were not quantifiable, while spinosad had enhanced recovery. All reagent blanks were reported as none detected.

Table 1. Sample Analyses for Priority Investigation No.15-KER-05

<table>
<thead>
<tr>
<th>Sample Type</th>
<th>Sample No.</th>
<th>cyfluthrin µg/spl</th>
<th>LOQ µg/spl</th>
<th>spinosad µg/spl</th>
<th>LOQ µg/spl</th>
</tr>
</thead>
<tbody>
<tr>
<td>DFR</td>
<td>0503-001</td>
<td>ND²</td>
<td>0.5</td>
<td>ND²</td>
<td>2.0</td>
</tr>
<tr>
<td>4 Swabs</td>
<td>0503-002</td>
<td>ND³</td>
<td>0.2</td>
<td>ND³</td>
<td>0.1</td>
</tr>
<tr>
<td></td>
<td>0503-003</td>
<td>ND³</td>
<td>0.2</td>
<td>ND³</td>
<td>0.1</td>
</tr>
<tr>
<td></td>
<td>0503-004</td>
<td>ND³</td>
<td>0.2</td>
<td>ND³</td>
<td>0.1</td>
</tr>
<tr>
<td></td>
<td>0503-005</td>
<td>ND³</td>
<td>0.2</td>
<td>ND³</td>
<td>0.1</td>
</tr>
<tr>
<td>Baseball cap</td>
<td>0503-006</td>
<td>ND³</td>
<td>40.0</td>
<td>ND³</td>
<td>5.0</td>
</tr>
<tr>
<td>Baseball cap</td>
<td>0503-007A</td>
<td>ND³</td>
<td>40.0</td>
<td>ND³</td>
<td>5.0</td>
</tr>
<tr>
<td>Sweatshirt</td>
<td>0503-007B</td>
<td>ND³</td>
<td>40.0</td>
<td>ND³</td>
<td>5.0</td>
</tr>
</tbody>
</table>

1 Spl - Sample
2 LOQ – Limit of quantitation
3 ND – Not detected
<table>
<thead>
<tr>
<th>Sample Type</th>
<th>cyfluthrin</th>
<th>spinosad</th>
</tr>
</thead>
<tbody>
<tr>
<td>DFR</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spike A</td>
<td>20</td>
<td>100</td>
</tr>
<tr>
<td>Spike B</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>Reagent Blank</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Swabs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spike A</td>
<td>0.5</td>
<td>1</td>
</tr>
<tr>
<td>Spike B</td>
<td>0.5</td>
<td>8</td>
</tr>
<tr>
<td>Reagent Blank</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Clothing Overspike</td>
<td>28</td>
<td>46</td>
</tr>
</tbody>
</table>

1. ND - Not detected
2. Not quantifiable due to clothing co-extractives

On May 20, WHS medical consultant, Dr. Mike O'Malley, and Associate Toxicologist Dr. Marylou Verder-Carlos, of the WHS Pesticide Illness Surveillance Program, participated in a public meeting with the crew members and conducted clinical interviews with the workers to gather exposure and symptom information. Their questions were similar to those used in investigating the 1997 Tulare County orange harvester illness episode, evaluating symptoms of dermal, ocular and respiratory irritation, as well as common systemic symptoms such as headache, nausea, and dizziness (1). Dr. O'Malley concluded that the workers' symptoms were consistent with exposure to cyfluthrin and that long-term adverse health effects from exposure to pyrethroids are not expected (see attached memo from Dr. O’Malley).

Cyfluthrin has previously been implicated in several illness incidents in which field workers developed symptoms of respiratory irritation (1,2). In 1998, DPR placed cyfluthrin in re-evaluation (5). Pursuant to this reevaluation, DPR is asking registrants to submit an inhalation irritation threshold study.

References:


Attachments
TO: Investigation File

FROM: Michael O’Malley, M.D., M.P.H.

DATE: July 14, 2005

SUBJECT: 15-KER-05 field interviews

On May 12, 2005, 27 vineyard workers and 3 emergency medical technicians were reported to be exposed to drift from an airblast sprayer application to a citrus orchard just north of where they were working. The pesticides applied were a combination of Baythroid™ (Cyfluthrin), Success™ (Spinosad) and 4-15 oil. On May 20, 2005, I interviewed and examined 25 of the 27 field workers at the field site in conjunction with staff from a local community clinic (Clinica Sierra Vista) and Dr. Marylou Verder-Carlos of the Worker Health and Safety Branch Pesticide Illness Surveillance Program. The initial discussion with the workers included a group discussion of the weather at the time of the incident. According to the consensus of the group, the wind was coming from the north at 7:00 a.m. on the day of the incident. Additional details regarding the wind and weather data on the day of the incident were available in a memorandum prepared by Terrell Barry, Ph.D. of the Environmental Monitoring Branch (attached).

The individual clinical interviews conducted were focused upon typical symptoms of skin and mucus membrane exposure to pyrethroid compounds [1]. Questions were similar to those used in investigating the 1997 Tulare County orange harvester episode [2, 3], evaluating symptoms of dermal, ocular and respiratory irritation, as well as common systemic symptoms such as headache, nausea, and dizziness. Demographic information, work activity information, use of long sleeve shirts, gloves and history of medical treatment were also recorded.

The workers interviewed included 23 women, who were working in the vineyard pulling leaves at the time of exposure, and 2 men, employed as irrigators. The workers ranged from 21 to 45 years of age, with a median age of 30.5 years. All reported wearing long sleeve shirts and 21 (84%) reported wearing gloves at the time of the incident. None reported a prior history of eczema or childhood dermatitis, but 6 (24.0%) reported a rash shortly after exposure on the day of the incident. Fifteen (60%), reported dermal paresthesias (this is a typical, but not unique, symptom of exposure to pyrethroids). Eight (32%) reported sneezing or rhinitis and 17 (68%) had sore throats or other symptoms of upper respiratory irritation. Three (12%) reported short-term problems with wheezing or asthma and 15 (60%) reported symptoms of chest tightness or shortness of breath. Other
frequently reported symptoms included: abdominal pain (in 19 [76%]), nausea (in 22 [88%]), diarrhea (in 9 [36%]), and headaches (in 16 [64%]).

Although a press release issued by the Kern County Department of Agriculture reported that 2 workers had seizures in the fields, none of the workers interviewed reported having convulsions. One worker did describe a brief fainting spell that occurred while she was being attended by emergency response personnel. On the day of the incident workers were treated at one of several hospitals in Bakersfield: these included San Joaquin Community Hospital, Kern Medical Center, Mercy, and Memorial Center. Most felt they received minimal treatment and minimal evaluation. Although they did not receive appointments for follow up care, several reported being seen by other medical facilities, including Clinica Sierra Vista.

In conjunction with Clinica Sierra Vista staff, we provided symptomatic treatment to workers seen on May 20. This was principally for residual symptoms of headaches, dizziness and nausea. We also gave out a fact sheet to provide reassurance regarding the expected short duration of symptoms related to cyfluthrin (see attached).

Comment

It is unfortunately not possible to evaluate the degree of exposure to pyrethroids with blood or urine testing. The symptoms reported by the affected workers are typical of those expected following exposure to cyfluthrin and other pyrethroid compounds. Long-term effects are not typically expected following pyrethroid exposures.
**Exposicion o contacto con Baythroid (Cyfluthrin)**

**Cual son los efectos que se le ocurre? (What are the effects?)**

- **Piel:** hormigueo o piel adormida, comezon, iritacion o ardor  
  Skin: numbnness, tingling, itching, burning

- **Nariz o garganta:** ardor, irritacion, mocos, rinitis  
  Nose and throat: burning, irritation, increased nasal secretions, rhinitis

- **Pulmones:** ardor, irritacion  
  Lungs: burning, irritation

- **Efectos generales:** dolor abdominal, asco o nausea, dolor de cabeza  
  Systemic symptoms: abdominal pain, nausea, headache

**Hay efectos a largo plazo? (Are there long term effects?)**

En casos reportados al estado no se ha encontrado efectos a largo plazo. La poca cantidad de Baythroid o cyfluthrin que se asimila adentro del cuerpo se descompone adentro en poco tiempo.

In cases reported to the state long-term effects have not been seen. The small quantity of Baythroid or cyfluthrin that is absorbed into the body following skin contact breaks down quickly.

**Causa cancer? (Does it cause cancer?)**

Por estudios con animales no se ha encontrado cancer por tomar cyfluthrin o Baythroid aun por tomar gran cantidades a largo plazo

In animal studies, cancer related to cyfluthrin has not been seen, although animals are treated with very high long-term doses.

**Hay dano a un embarazo? (Is there risk for a woman who is pregnant?)**

Por estudios en animales tomando cyfluthrin durante un embarazo no se ha encontrado abortos o otros danos al embarazo.

Animals taking cyfluthrin during pregnancy have not experienced abortions and other pregnancy risks

**Hay otros efectos? (What are the other effects?)**
Algunas veces se encuentra ansiedad o susto después de una exposición aguda a pesticidas. Sea más probable en personas que ya tienen una condición de ansiedad.

Some times anxiety occurs after an acute exposure to pesticides. It may be more probable in those with pre-existing anxiety disorders.

Cuánto tiempo se dura las síntomas? (How long do the symptoms last?) Hay Tratamiento o medicinas? (Are there treatments for illness symptoms?)

No hay tratamiento específico para exposición. Sin tratamiento, la mayoría de los efectos ocurren a corto plazo, por contacto directo a la piel, la nariz o la garganta.

There is no specific treatment for exposure to the pesticide. Without treatment, the majority of effects are short term, related to contact with the skin, nose or throat.

Michael O’Malley, M.D.
Universidad de California, Davis
Clinica: 530-757-3200
Oficina de la Agencia de Protección Ambiental: 916-445-4281
Questionnaire used for interviews:

Nombre: Edad:

**Preguntas tocante su trabajo:** (Questions regarding your work history)
Usa camisa con mangas largas cuando esta trabajando? (Do you use long-sleeved shirt while working?)
Usa guantes cuando esta trabajando? (Do you wear gloves while working?)

**Preguntas tocante su historia de alergias** (Questions regarding your history of allergies)
De niño/nina tenia problemas de con salpullido o erupciones de la piel? Si No (As a child did you have a problem with rashes or eczema? Yes no)

**Preguntas tocante problemas de la piel:** (Questions dealing with skin problems)
Tuvo salpullido (ronchas o comezon o ardor de la piel)? Si No (Did you have a rash (itching or burning of the skin? Yes no)
En que fecha le empezó? (If yes: On what day or date did it begin?)
Hormigueo? Si No (A feeling of something crawling on the skin? Yes no)
En que fecha le empezó? (If yes: On what day or date did it begin?)

**Preguntas tocante problemas de la respiración:** (Questions regarding respiratory problems)
Estornudo? Si No (Sneezing? Yes no) Rinitis? Si No (Rhinitis? Yes no)
Ardor o dolor de la garganta? Si No (Sore throat? Yes No) Tos? Si No (Cough? Yes no)
Asma o Resuello? Si No (Asthma or wheezing? Yes no)
En que fecha le empezó? (If yes to any of the above, on what day or date did it begin?)

**Preguntas tocante afecion del abdomen** (Questions regarding abdominal complaints)
Dolor del abdomen? Si No (Abdominal pain? Yes No) Diarrea? Si No (Diarrhea? Yes No)
Nausea o asco? Si No (Nausea? Yes No)
En que fecha le empezó?  ______________
If yes to any of the above, on what day or date did it begin?  ______________

Otras sintomas (Other symptoms): _____________________________________________

Convulsiones o ataques?  Si  No (Convulsions? Yes  No)
Aviso a su mayordomo o supervisor?  Si No (Did you inform your supervisor? Yes  No)
Cuando Fue? Que fecha?  ____________ (When did you inform your supervisor? What date?)

Fui a un doctor?  Si  No (Did you go to the doctor? Yes  No)
Cuando Fue? Que fecha?  ____________ (If yes, when did you go? What date?)

Nombre del doctor o hospital:  __________________________  Direccion: __________________________
Telefono:  __________________________
Reference documents


Memo from Terrell Berry to Kean Goh is attached to pdf document… available in pdf format only.