Department of Pesticide Regulation

Mary-Ann Warmerdam
Director

Arnold Schwarzenegger
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TO: Susan Edmiston, Branch Chief **HSM-07002**
Worker Health and Safety Branch

FROM: Bernie Hernandez, Associate Environmental Research Scientist
Worker Health and Safety Branch *(original signed by B. Hernandez)*
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Zahangir Kabir, Associate Environmental Research Scientist
Worker Health and Safety Branch *(original signed by Z. Kabir)*
(916) 445-4244

DATE: September 10, 2007

SUBJECT: PROJECT 0703 – WORKER HEALTH AND SAFETY INVOLVEMENT IN PRIORITY INVESTIGATION 37-TUL-07; EARLY ENTRY INVESTIGATION, TULARE COUNTY

On July 11, 2007, Bernie Hernandez and Zahangir Kabir of WHS Exposure Monitoring and Health Investigation Program (EMHIP) were in Firebaugh, contacting potential cooperators for project 0301 (Irrigator Pesticide Exposure Study in Cotton). At approximately 0845 hours, EMHIP Senior Environmental Research Scientist Janet Spencer notified them of a possible priority investigation that had occurred on July 10 in Tulare County, involving citrus workers affected by exposure to chlorpyrifos. She instructed Bernie and Kabir to contact Al Lomeli, Supervisor of DPR's Central Regional Office, Pesticide Enforcement Branch, and the Tulare County Agricultural Commissioner's office (CAC) office for updated information. She also instructed them to head towards the incident site and collect dislodgeable foliar residue (DFR) samples.

Bernie and Kabir arrived at the Tulare CAC office around 1130 hours and met with David Case (Agricultural Standards Inspector IV). David was in the process of confirming the following: An application of Lorsban®-4E (Lorsban, Reg. 62719-220, 44.9% chlorpyrifos) was made to an 18-acre Valencia orange grove (Township 23, Range 28, Section 9 of Tulare County; see map in (Appendix 2). The application was completed on July 10 at 0300 hours. Lorsban has a restricted entry interval (REI) of 5 days in oranges and the label requires that workers be notified of applications by both oral warning and posted warning signs. Two harvesting crews (Rodriguez Labor [work crew 1], 26 workers, and J. C. Gutierrez [work crew 2], 11 workers) entered the unposted grove at 0430 hours, approximately 90 minutes after the application was completed. The workers detected a strong pesticide odor and noticed the leaves were wet. At 0600 hours, work crew 1 was removed from the southeast portion of field 01-105 (WHS I.D. Block 2), with some of the workers experiencing headaches. Work crew 2 was removed from the northwest section of field 01-105 (WHS I.D. Block 1) shortly thereafter, with none of the crew experiencing illness symptoms at that time.

On-Site Investigation

At 1220 hours, Bernie and Kabir evaluated the incident site to develop an appropriate sampling strategy. The attached four photographs (1-4) document observations made at the incident site and show that the field was now posted (photos 2, 3). The posted warning signs show that the REI was in effect when the workers were in the field. The signs were posted after the incident occurred and after the CAC had collected foliage samples.

Sampling

Bernie and Kabir collected eight orange DFR samples and four pistachio DFR samples (Appendix 3). Each sample consisted of 40 leaf disks in a 4-oz glass jar. Since the pistachio orchard bordered the oranges on two sides, WHS collected the pistachio DFR samples in case it was later determined that the incident was due to drift from a chlorpyrifos application to the pistachios. At 1700 hours, Bernie and Kabir delivered the iced DFR samples to the FedEx depot at the Visalia airport for overnight delivery. DFR sampling was conducted in accordance with HS-1600, Guidance for the Determination of Dislodgeable Foliar Residues[1] and the following WHS standard operating procedures (SOPs)

- WHS-FO03, Dislodgeable Foliar Residue Sampling
- WHS-FO04, Identification and Labeling of Samples
- WHS-FO05, Sample Tracking, Shipping and Receiving
- WHS-FO07, Records and Notebooks (Field Data), and
- WHS-FO08, Project Documentation and Numbering

Project Documentation

On July 17, 2007 the Tulare CAC office provided the following updates and confirmation:

- A copy of the completion notice, documenting that the application of Lorsban® - 4E to oranges at 0.5 gal/acre was completed on July 10 at 0300 hours (Appendix 1).
- Annotated lists of the 37 workers in the harvest work crews 1 and 2, indicating that 16 workers in crew 1 experienced illness symptoms. To date, none of the crew 2 workers reported illness symptoms; however, four workers had not yet been interviewed.
- Confirmation through harvest crew interviews that the orange grove had not been posted at 0430 hours on July 10, 2007, when they entered and noticed wet leaves and a strong pesticide odor.

Results

The chlorpyrifos DFR results (μg/cm^2) on oranges and pistachios are shown in Table 1. The mean orange DFR was 0.180 ± 0.093 μg/cm^2 chlorpyrifos and, for pistachios, 0.002 ± 0.004 μg/cm^2 chlorpyrifos. Iwata et al., in a 1983 citrus study[2], found initial residues of 0.3 – 0.7 μg/cm^2 chlorpyrifos, and a mean half-life of 3 days following respective applications of 5 and 10 lb/acre chlorpyrifos. Since the incident grove was treated at 0.5 lb/acre chlorpyrifos (5 - 10% of the application rate used in the Iwata study), initial residues would be anticipated to be lower, by an undetermined amount, than those found in the Iwata study. Nonetheless, applying Iwata's initial DFR and estimated half-life to the orange chlorpyrifos residues in this investigation, it would be anticipated that in the 1.5 days between application and sample collection, chlorpyrifos residues would have decayed by approximately 50% of the first residue half-life, or that 25% of the initial residue had dissipated. Using Iwata's findings of 0.3 –0.7 μg/cm^2 chlorpyrifos, the predicted DFR at 1.5 days post-application would be 0.23 – 0.53 μg/cm^2 chlorpyrifos. WHS orange DFRs, at 0.18 μg/cm^2, were at or slightly below the low end of the predicted residue range (78% of the lower range), likely due to lower initial deposition.

Table 1. Chlorpyrifos Dislodgeable Foliar Residues in Valencia Oranges and Pistachios

Crop, Block, Sample No.	Rows Sampled	μg/cm^2 chlorpyrifos
Oranges, Block 1		
WR07-001	1-5	0.131
WR07-002	6-9	0.144
WR07-003	10-15	0.161
WR07-004	20-30	0.310
Mean DFR, Block 1		0.187
Oranges, Block 2		
WR07-005	1 –5	0.061
WR07-006	8-12	0.093
WR07-007	13-18	0.236
WR07-008	20-24	0.303
Mean DFR, Block 2		0.173
Mean Orange DFR ± SD		0.180 ± 0.093
Pistachios, Block 3A		
WR07-009	1-2	0.002
WR07-010	6-7	0.002
Pistachios, Block 3B		
WR07-011	14-15	0.011
WR07-012	11-12	0.007
Mean Pistachio DFR ± SD		0.002 ± 0.004

References

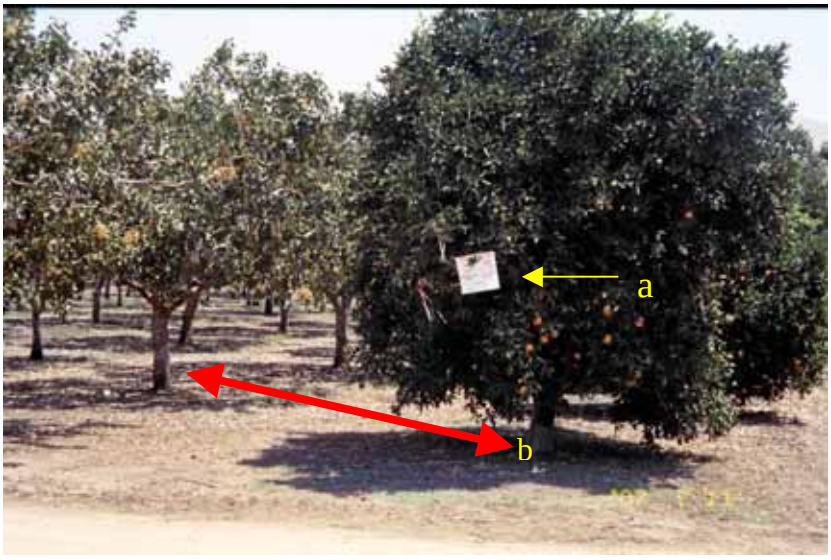
Edmiston S, Powell S, Spencer J, Curtis C. 2002. Guidance for Determination of Dislodgeable Foliar Residue. Health and Safety Report HS-1600. 1001 I Street, Sacramento, CA, Cal/EPA, Department of Pesticide Regulation, Worker Health and Safety Branch. Web Access: http://www.cdpr.ca.gov/docs/whs/pdf/hs1600.pdf

Iwata Y., O'Neal JP, Barkley JH, Dinoff TM, Dusch ME. 1983. Chlorpyrifos applied to California citrus: residue levels on foliage and on and in fruit. J. Agric. Food Chem. 31: 603-610.

cc: Al Lomeli, Pesticide Enforcement Branch, Central Regional Office
Jim Shattuck, DPR Agricultural Commissioner Liaison
David Case, Tulare CAC

Photo 1. Bins scattered throughout WHS ID Block # 1 and WHS ID Block # 2

Photo 2. Orange Trees next to Pistachio trees.



Note the posting (a) and proximity of trees (b is approximately 12 feet).

Photo 3 Posted Warning Sign

Photo 4 Bin of dumped tainted oranges.

Appendix 1. Notice of Completion for Lorsban® 4-EC application to oranges on Wilder Ranches

07/17/2007 08:20 5596853336 TULARE CO AG COMM PAGE 06/08

Tiger JILL Another Quality Product of Orange Enterprises, Inc.

APPLICATION ALL DATA

B

Reference: Record Entry Date: 7/13/2007 Crop: Oranges
Proposed Start Date: 7/9/2007 Start Time: 8:30 pm Expiration Date: 7/16/2007 Identifier: 28819
Completion Date 7/10/2007 Time: 3:00 am Purchase Order N
Owner: Wilder Ranches Supervisor: Rash Chris
Applicator: Supplier: C PCA: Hawkins David
Reason: Field Observation Map:
Total Treated Area: 16.00 ac Band Treated Area: 16.00 ac
Dilution: 1,500.0 Tank Size: 500.00 # Loads: 48.00 Method: Ground Reentry: 5 day Harvest: 35 day
Totals Total Charges: $1,920.00 Total Material $0.00 Grand Total: $1,920.00
Federally Restricted Material inclor

Block Information

A

Site, Block	Treated	Completion	Bill To	Start Date & Time	Rate	Band	Band Area
01-105, Linda V Ora	16.00	7/10/2007 3:00am	Wilder Ranches	7/9/2007 8:30 pm			16.00

Material Information SFP : S - State Restricted, F - Federally Restricted, P - Permit Required

Material	SFP	Rate	Total	Pest	Tank	Dilution/100	Unit Cost	Total	Tax
Lorsban-4e		12.00 pt	24.00 gal	California red scale	0.50gal	0.80 pt	.0000	0.00	N
415 Narrow Range Oil		7.50 gal	120.00 gal	RED SCALE	2.50gal	0.50 gal	.0000	0.00	N
First Choice Keep		9.00 lb	144.00 lb		3.00lb	0.60 lb	.0000	0.00	N
ZNM		6.00 lb	96.00 lb		2.00lb	0.40 lb	.0000	0.00	N

Charge Information

Charge	Rate	Unit Name	Unit Cost	Quantity	Amount	Charged
SPRAY APP FEE	1.00	ACRE	$120.0000	16.00	$1,920.00	Y

Measurement Information

Measurement	Reading	Unit	Description

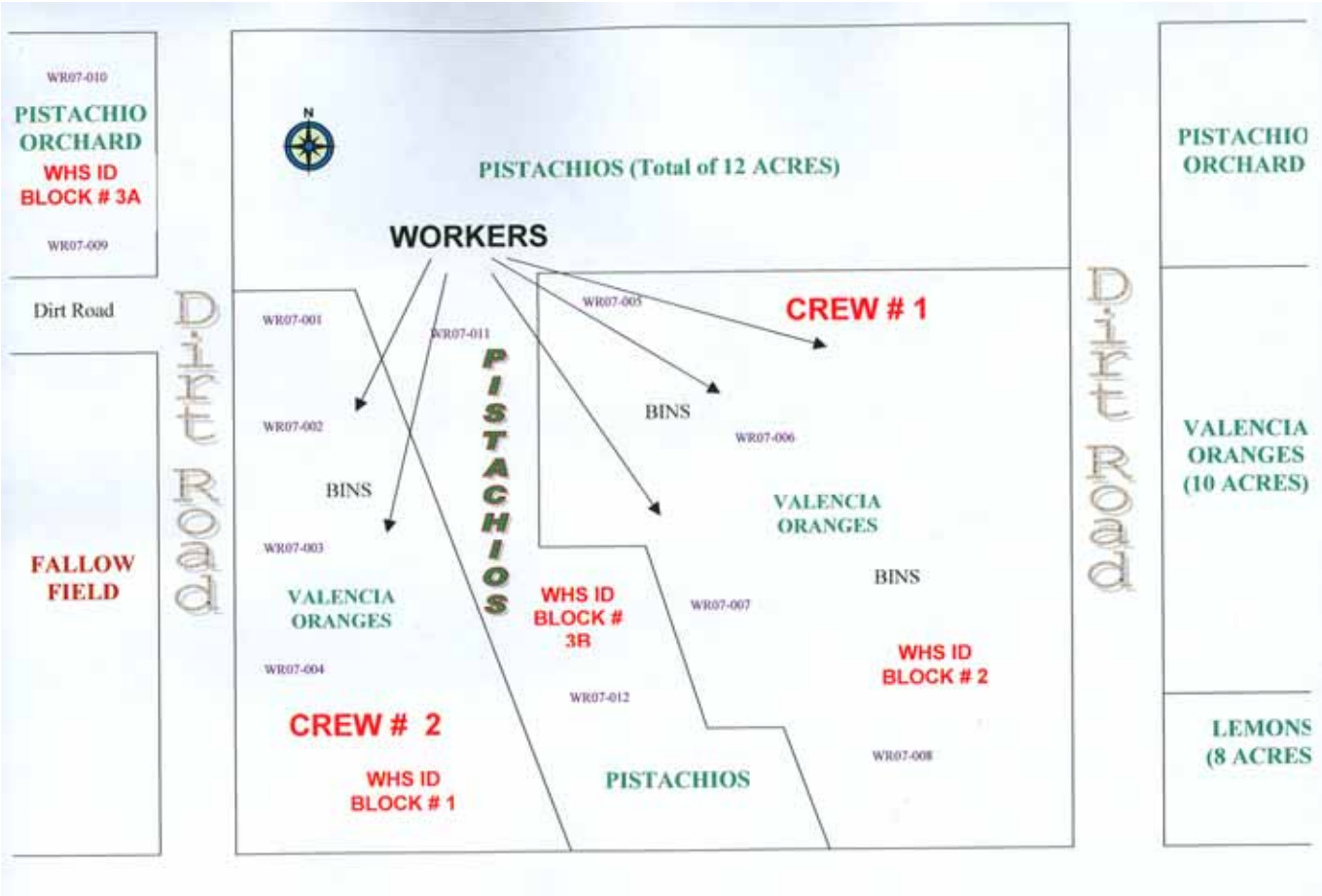
Crew Information

Employee Name
Navarette Johnny
Salazar Federico
Galvan Eduardo
Villagrano Jose
Gonzalez Arnaldo

Band Treated Area : Proposed: Completed:
Treated Area: Proposed: Completed:

RECEIVED ON
JUL 16 2007
PUE

on (A) July 9, 2007 and completed on (B) July 10, 2007 at 3:00 a.m. with a (C) Restricted Entry Interval (REI) of 5 days.

Appendix 2. Satellite photograph of Wilder Ranch

Appendix 3. Schematic diagram of Wilder Ranch showing location of work crews, block ID's and collected samples. Diagram is not to scale.