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MEMORANDUM

TO: Susan Edmiston, Senior ERS
Worker Health and Safety Branch **HSM-00008**

FROM: Janet Spencer, Associate ERS [Original signed by J. Spencer]
Worker Health and Safety Branch

DATE: November 14, 2000

SUBJECT: BRANCH ACTIVITIES AND RESULTS OF ANALYSES FROM OUR
INVOLVEMENT IN THE INVESTIGATION OF 44-FRE-99¹
(PROJECT 9904)

Incident Chronology

On September 9, 1999, a crew of 11 field workers entered a Fresno County vineyard to harvest a 17-acre block of raisin grapes (episode field). Within approximately 3 hours, crew members experienced sneezing, flu-like symptoms, and burning and itching on their arms, neck, face, and eyes. Seven workers sought and received medical treatment at the University Medical Center in Fresno. Worker Health and Safety Branch was informed of the incident late in the afternoon on Friday, September 10.

WH&S immediately dispatched Bernie Hernandez to the site to collect and/or transport dislodgeable foliar residue (DFR) samples. Mercy delValle, supervisor of WH&S unit of the California Department of Food and Agriculture (CDFA) Center for Analytical Chemistry, arranged for staff to be present to receive and extract samples on Saturday, September 11.

Leonard Herrera, of the Pesticide Enforcement Central Regional Office, was at the site on September 10 and collected eight DFR samples which Bernie delivered to the CDFA laboratory on September 11. Pesticide use reports showed that dusting sulfur was applied to the episode field on July 14, 1999, at 15 lb/acre and Omite[®] 30W (active ingredient, propargite, DPR registration number 400-82-AA, Uniroyal Chemical Company, Inc.) was applied on July 26 at 7 lb/acre. The respective restricted entry intervals (REI) are 1 day for sulfur and 30 days for propargite. Thus, the illness episode occurred 57 and 45 days, respectively, after the sulfur and propargite applications.

Chemists washed and extracted the samples on September 11, 1999. Samples were analyzed on September 13 for propargite and sulfur and also underwent a pesticide screen using an ion-trap detector. Gas chromatography analyses verified that all eight extracts contained residues of sulfur, propargite and λ -cyhalothrin (active ingredient in Warrior[®], DPR registration number 10182-96-ZA, Zeneca, Inc.). Table I presents the analytical results for the eight DFR samples.

Table I. Dislodgeable Foliar Residue (DFR) on Grape Foliage ($\mu\text{g}/\text{cm}^2$) in Episode Field Project 9904 (44-FRE-99)

Sample Number	λ -cyhalothrin	Propargite	Sulfur
LH0910-1	0.59	0.42	0.23
LH0910-2	0.41	0.36	0.27
LH0910-3	0.43	0.38	0.20
LH0910-4	0.27	0.30	0.11
LH0910-5	0.53	0.56	0.29
LH0910-6	0.38	0.27	0.09
LH0910-7	0.49	0.27	0.97
LH0910-8	0.35	0.22	0.33
<i>Mean</i>	<i>0.43</i>	<i>0.35</i>	<i>0.31</i>
<i>Standard Deviation</i>	<i>0.10</i>	<i>0.11</i>	<i>0.28</i>

Subsequent investigation confirmed that Warrior[®], which is not registered for use on grapes, was mistakenly mixed and applied with Omite[®] 30W on July 26. On September 17, 1999, Douglas Edwards, Deputy Agricultural Commissioner for Fresno County, declared the episode field to be a hazardous area due to propargite and λ -cyhalothrin residues². The order prohibited employee entry unless the grower contacted Fresno CAC to determine what medical supervision and personal protective equipment would be required for workers re-entering the vineyard.

Follow-up Investigation

Comparison of residues with 1998 λ -cyhalothrin DFR residue data for Romaine lettuce showed DFR in the episode field approximately 12 times greater than that measured previously³. The effects of exposure to average λ -cyhalothrin DFR levels of $0.43 \mu\text{g}/\text{cm}^2$ are not documented. Toxicology profiles indicate acute exposures may potentially result in dermal tingling, burning or numbness, and eye irritation⁴.

Propargite and sulfur have been implicated in a number of dermal illness episodes over the past 20 years^{5,6,7}. All eight samples in the episode field showed propargite levels above $0.20 \mu\text{g}/\text{cm}^2$, the estimated Safe Reentry Level for repeated exposures to nectarine harvesters⁵. WH&S previously found that at least one pesticide, methomyl, degraded more slowly as the summer season progressed⁸. To evaluate the possibility that slow dissipation of propargite may have contributed to the illnesses, WH&S initiated focused DFR sampling in surrounding vineyards at expiration of the propargite 30-day REI.

Between September 16 – 30, WH&S staff collected 120 DFR samples from grape vineyards in Fresno and Kern counties which had been treated with propargite 30 – 35 days earlier. Samples were analyzed for propargite, sulfur and λ -cyhalothrin residues using a gas chromatograph

equipped with an ion-trap detector. Summary results are presented in Table II; as expected, no λ -cyhalothrin residues were detected. Propargite was present on 120 samples and sulfur on 58 samples. Propargite residues were distributed as follows:

- The maximum DFR of 13.52 ug/cm^2 for propargite was present on a single sample,
- 13 samples (11%) had residues greater than 1.0 ug/cm^2 ,
- 20 samples (17%) had residues between 0.20 and 1.0 ug/cm^2 ,
- 87 samples (72%) had residues below 0.20 ug/cm^2 ,
- 18 samples (15%) had residues between 0.1 and -0.2 ug/cm^2 , and
- 60 samples (50%) had residues of less than 0.1 ug/cm^2 .

For sulfur, 10 samples had residues of 10 ug/cm^2 or greater, while 50% of the samples had residues less than 1 ug/cm^2 .

Table II. Summary of Dislodgeable Foliar Residue (DFR, ug/cm^2) on 120 Grape Foliage Samples at Expiration of the Reentry Interval for Propargite (30 - 35 days post-application) Project 9904 (44-FRE-99)

Analyte	Detections	Mean	Standard Deviation	Max	Min
Propargite	120	0.41	1.32	13.52	0.03
Sulfur	58	3.37	5.16	22.20	0.02
λ -cyhalothrin	None	--	--	--	--

Recommendations

Focused sampling did not indicate that propargite decayed more slowly during this part of the season. While propargite levels may have had a role in the incident, we considered the high levels of λ -cyhalothrin to be the primary cause of the illness outbreak. WH&S had no background information to use in estimating the decay rate for such high residues. Thus, on October 26, 1999, WH&S issued a memo stipulating the following recommendations for remediation at the episode field⁹:

1. Persons entering the field to collect the raisin trays must wear a properly fitted N95 particulate respirator, a disposable coverall, boots, and disposable gloves. Employees are **not** permitted to conduct this task.
2. Employees entering the field to conduct activities that do not involve foliar contact must wear a properly fitted N95 particulate respirator.
3. Employees are prohibited from entering the field to conduct any activity involving foliar contact until after the natural seasonal defoliation has occurred. Other persons entering the vineyard who may encounter foliar contact must wear a properly fitted N95 particulate respirator, a disposable coverall, boots, and disposable gloves.
4. The field shall be posted against entry until natural defoliation has occurred.

5. Family members entering the field are urged to comply with the above recommendations concerning personal protection.
6. The above conditions will be in effect until natural defoliation has occurred.

REFERENCES

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