



**Summary of Comments on the Department of Pesticide Regulation's
Chloropicrin Mitigation Proposal, dated May 15, 2013, and Responses
(Includes Submitted Written Comments and Oral Comments Made at Public Meetings)**

January 6, 2015

General –

- 1. Mitigation proposal is too restrictive. Proposed measures will increase cost and be disruptive to fruit and nut crop and nursery industries. CDPR needs to take into account the economic impact to growers and communities of mitigating beyond U.S. EPA label restrictions. Losing farming tools, and need replacements now. Historical usage and exposure patterns do not support this level of restrictions. Jeff Gorell, Assemblyman 44th District; Burt Bundy and Robert Williams, Supervisors, Tehama County; Nadine Bailey (oral comments) and Assemblyman Brian Dahle, First District; Debbie Arnold, Supervisor District 5, San Luis Obispo; Dirk Giannini, Manager, Christensen & Giannini; Husein Ajwa, UC Cooperative Extension Specialist; Emerson Kono, Farmer, Kono Farms; Larry Munger, District 3 Supervisor, Sutter County; James Gallagher, Supervisor District 5, Sutter County; John Nicoletti, Supervisor District 2, Yuba County; John Pedrozo, Supervisor District 1, Merced County; Larry Ferini, Rancho Laguna Farms; Les Heringer, M&T; Margie Barrios and Anthony Botello, Supervisors District 1 and 2, San Benito County; Mark Nickerson, Grower, Prime Time Farming; Matt Rexroad, Yolo County Supervisor; Norm Groot, Executive Director, Monterey County Farm Bureau; Peter Adam, 4th District Supervisor, Santa Barbara County; Peter Foy, 4th District Supervisor, Ventura County; Randy Sharer, Grower, Sharer Brothers; Renee Pinel, President/CEO, Western Plant Health Association; Christine Christian (oral comment), Community member; Laurence London, independent consultant; Lance Runels (oral comment) Glad-A-Way Gardens Inc; Daniel Hertwis (oral comment), Nisei Farmers League.**

DPR is aware proposed mitigation measures will likely cause some initial disruption to many agricultural industries. However, after reviewing the label changes the U.S. EPA made to their fumigant labels in 2010 and 2012, DPR determined these changes did not adequately address the exposure scenarios that may be associated with chloropicrin use in California.

In addition to scientific considerations, risk mitigation development involves knowing and understanding social, economic, and feasibility issues, as well as technologic limitations, and legal considerations. DPR considers all these factors in analyzing the possible regulatory impacts to potential health hazards. Where data are lacking, this process may be



somewhat subjective and requires value judgments based on existing data, experience with similar pesticides, as well as on the acceptability of risks and reasonableness of control measures. Final mitigation measures have incorporated modifications based on public comments received.

2. **Supports DPR buffer zones and mitigation measures, but would like EPA buffer zone credits included. Mitigation measures for combination products should be easily understood and streamlined into product specific requirements. Rick Gurrola, Doug Compton (oral comment). Tehama County Assistant Agricultural Commissioner.**

DPR agrees that mitigation measures for combination products should be easily understood and streamlined into product specific requirements. DPR's intent is to align our mitigation measures as best as possible with current Federal label requirements. U.S. EPA controls what registrants must have on labels. DPR is open to working with U.S. EPA and the product registrants to develop California-only labeling. DPR has evaluated the data used to support the U.S. EPA buffer zone credits included on the labels, and currently only supports the credits allowed for tarps.

3. **Supports DPR's controls. Time is needed to develop chloropicrin alternatives. Chloropicrin is needed in the meantime. Dose makes the poison. Jesus Alvarado (oral comment), Freslava Berry LLC; Mark Bolden (oral comments), UC Cooperative Extension; Dirk Giannini (oral comment), Christensen & Giannini; Victor Tognazzini (oral comment) Gold Coast Farms / Santa Barbara County Farm Bureau; Pat Ricchindi (oral comment), Grower & handler.**

DPR agrees the fumigant alternatives currently available are not yet economically comparable to the use of chloropicrin. DPR seeks to promote the development of alternatives through the "Nonfumigant Strawberry Working Group", and allocation of grants to groups researching fumigant alternatives. However, DPR's primary goal in mitigating chloropicrin is to protect human health. Unacceptable health hazards and exposure events have occurred from chloropicrin use in California; therefore additional mitigation measures are needed to protect human health.

More information on the "Nonfumigant Strawberry Working Group" and grants allocated by the department can be found on DPR's Pest Management Projects web page at <http://www.cdpr.ca.gov/docs/pestmgt/projects.htm>. A review of the current status of non-fumigant alternatives can be found at <http://californiaagriculture.ucanr.org/issue.cfm?volume=67&issue=3>.

4. **Strawberries are important for the community. Why are additional regulations needed? Chloropicrin is not carcinogenic. Jose Luis Alvarado (oral comment), Prestige Farms – Ag Solutions Consulting.**

DPR agrees strawberries are important to many communities. Before developing the chloropicrin mitigation, DPR reviewed the label changes the U.S. EPA made to their fumigant labels in 2010 and 2012, and determined these changes did not adequately

address exposure scenarios associated with chloropicrin use in California. DPR has concluded that there is not enough evidence to establish that chloropicrin is a carcinogenic hazard requiring mitigation. See the Risk Management Directive and the April 23, 2013 memorandum from Dr. Marylou Verder-Carlos to Christopher Reardon, Appendix 2 and 3 to Chloropicrin Proposed Mitigation found on DPR's Web site at www.cdpr.ca.gov/docs/whs/pdf/dpr_chloropicrin_mitigation_proposal_and_app_1-3.pdf. See also responses to comments numbered 27, 33, 34, and 35. DPR believes that the mitigation measures for acute exposures are needed to protect people living and working near strawberry fields treated with chloropicrin from eye or respiratory irritation.

5. **A cover letter for 47 similarly worded letters from a variety of businesses. General letter supporting grower and farmers in the state and for the continued use of chloropicrin. Tim Martinez, Martinez Communication, et al (47 additional letters); Vincent Martinez, Managing Partner, Twitchell and Rice LLC.**

DPR recognizes the economic value of chloropicrin to the agricultural industry and supports its continued use, with additional controls to protect people living and working near treated fields from acute exposure that can cause eye and respiratory irritation.

6. **Farmers in California already use more safety measures than farmers in any other state or county, which were introduced out of an abundance of caution: buffer zones that separate their fields from nearby homes and communities; licensed applicators who are properly trained; signage to keep people out of their fields after application; and plastic tarps that are designed to prevent leakage. DPR will partner with County Agricultural Commissioners (a resource unique to California) to implement the additional mitigation measures, which should reduce the potentially extreme burden on agriculture and particularly small family farmers. There is a strong incentive to comply with the proposed mitigation measures as there are no economically viable alternatives to the currently registered fumigants for the control of soil borne plant diseases. Jeffrey Jenkins, Ph.D., Professor, Oregon State University, Department of Environmental and Molecular Toxicology; JJ Levenstein, MD, FAAP, President of MD MOMS, makers of Baby Silk; Courtney Sorensen (oral comment), Fresno County Farm Bureau.**

DPR agrees with these comments.

7. **Non-TIF tarp buffer zones are too large and coordinating with neighbors will be challenging. Proposed restrictions would make it difficult to use chloropicrin at all, even though there are no good alternatives to chloropicrin. 80% buffer zone is doable. Current acreage in buffer zones yields half of treated fields. Mark Mason, Grower, Huntington Farms; Michael Stanghellini, Director of Research and Regulatory Affairs, TriCal Inc.; Steve Powell, Grower/Owner, Peter Rabbit Farms.**

DPR realizes that chloropicrin is an essential tool for growers and has adopted the 95th percentile (concentration at the buffer zone distance is less than DPR's target concentration for 95% of the applications), which is both health protective, and still workable. DPR has

corrected some errors in the data, resulting in smaller buffer zones than originally proposed.

8. **DPR should not use county permit conditions to implement mitigation measures. Permit condition wording does not get carefully vetted and may not stand-up when being challenged. Patrick Griffin, Agriculture Commissioner, Siskiyou Co.**

DPR disagrees with the statement that permit conditions are not vetted. DPR has vetted the mitigation proposal extensively and has and will continue to work with county agricultural commissioners to assure that recommended permit conditions are adequate and enforceable.

9. **DPR should include an acronym appendix in the final mitigation. Patrick Griffin, Agriculture Commissioner, Siskiyou Co.**

DPR agrees that an acronym appendix would be very useful and has included a list of acronyms in the final mitigation document.

10. **DPR should standardize regulations for MeBr and Chloropicrin products. Patrick Griffin, Agriculture Commissioner, Siskiyou Co.**

DPR agrees, and has reviewed current methyl bromide regulations, interim soil fumigant recommended permit conditions, and chloropicrin mitigation measures to ensure clarity and consistency.

11. **Ban fumigants by 2020. Californians for Pesticide Reform, Center for Environmental Health, Environmental Working Group, Pesticide Action Network, and United Farm Workers.**

12. **Phase out fumigants by 2014. Green Party of Monterey County; Sarah Hutchinson, Fresno Co. Resident; Maria R. Barajas (oral comment), Community member; Gloria Hernandez (oral comment), Community member.**

DPR understands your position and supports the continued research for fumigant alternatives through the “Nonfumigant Strawberry Working Group” and allocation of grants to groups researching fumigant alternatives. As alternatives become available for large-scale farming, reduced fumigant use may occur. However, the purpose of these mitigation measures is to protect the public from the continued use of chloropicrin. More information on the “Nonfumigant Strawberry Working Group” and grants allocated by the department can be found on DPR’s Pest Management Projects web page at <http://www.cdpr.ca.gov/docs/pestmgmt/projects.htm>. A review of the current status of non-fumigant alternatives can be found at <http://californiaagriculture.ucanr.org/issue.cfm?volume=67&issue=3>.

13. **Preplant fumigation with products containing chloropicrin is a critical grower tool for a number of important crops such as almonds, stone fruits, nurseries, cut flowers, curcubits and strawberries. Without healthy soil crop yields would be significantly**

reduced and in many cases growers would have to use more pesticides, fertilizers and water to produce their crops. Chloropicrin is necessary to produce clean nursery stock for all strawberry producers, including the organic producers. Based upon past usage, the proposed mitigation measures are not justified. Anthony Carrillo, Grower, Milfeld's Nursery Inc.; Hebe Bradley, Norcal Nursery, California Strawberry Nurserymen's Association; Joe Rovito (oral comment), Lassen Canyon Nursery; Christopher Winterbottem, Sierra-Cascade Nursery, Inc.; Chloropicrin Manufacturers' Task Force; JJ Levenstein, MD, FAAP, President of MD MOMS, makers of Baby Silk; Christopher Valadez (oral comment) CA Grape and Tree Fruit League; Aimme T. Brooks, Director Regulatory Affairs, Western Agricultural Processors Association. With no viable options available.

DPR agrees chloropicrin is currently a critical tool for agricultural production in California. However, DPR's risk assessment identified unacceptable health risks and exposure scenarios.

When developing the mitigation measures, DPR reviewed a number of documents, including pesticide use reports, pesticide illness reports, and California County permit conditions. DPR also observed a number of chloropicrin applications, talked with growers and applicators, CAC staff familiar with local needs for fumigant use, as well as worker advocates. These mitigation measures may cause some initial disruption to the agricultural industry, but are necessary to adequately protect bystanders.

14. **It is important to consider the impacts in California of U.S. EPA's recent label changes before deciding whether any additional measures are needed. DPR should more carefully evaluate the impacts of the now-mandatory GAPs on mitigating potential exposures, which incorporate proven procedures designed to address incidents where emissions impacted bystanders. If the GAPs had been used, the impacts would not have occurred. Even with the past illness incidents included, California has a very low frequency of incidents (0.13% of applications in the last 4 years). Chloropicrin Manufacturers' Task Force; Michael Stanghellini, Director of Research and Regulatory Affairs, TriCal Inc.; Richard Reiss, Exponent Inc. (also of Reiss and Griffen 2006).**

After reviewing fumigant label changes made by the U.S. EPA in 2010 and 2012, pesticide use reports, pesticide illness reports, and California County permit conditions, DPR determined that EPA's label changes did not adequately address potential health impacts associated with chloropicrin use in California. DPR's intent is to align California state mitigation measures as best as possible with current Federal label requirements. A crucial component of DPR's mitigation process is evaluating the success of the changes put in place. Once DPR's mitigation is in place, we will assess the effect of both the label changes and DPR mitigation, with the goal of allowing chloropicrin to be used safely with no bystander illnesses.

15. **Would like mitigations to be consistent with U.S. EPA (essentially mitigation measures equal label restrictions). Growers want to protect their workers. It is**

essential that any control measures allow the use of chloropicrin. With the loss of methyl bromide, there is little left to control problem pests. Renee Pinel, President/CEO, Western Plant Health Association; Jim Bogart (oral comments), Grower-Shipper Association of Central California; Steve Pastor (oral comment) Riverside County Farm Bureau; Christopher Bunn, Crown Packing Co., Inc.; Louis Huntington; Tammy Terra, Assistant Property Manager, Seacoast Farms, LLC; Candace Larie Evans, rancher; Mike Dusi, rancher; J M Mclean, grower; Bill Cochrane, rancher; J W Somers, rancher; Jane Donlon Waters, Donlon Ranch; Dirk Giannini, Christensen & Giannini; Yolanda Daughty; Mike Brucker Ranch Co., Tres Hijas Berry Farms, LLC; Mary Orradie, rancher; James Finch, Finch Farms LLC.

After reviewing fumigant label changes made by the U.S. EPA in 2010 and 2012, pesticide use reports, pesticide illness reports, and California County permit conditions. DPR determined that EPA's label changes did not adequately address potential health impacts associated with chloropicrin use in California. DPR seeks to develop mitigation measures to simultaneously address health concerns and allow for the continued use of chloropicrin in California. DPR's intent is to align California state mitigation measures with current Federal label requirements. DPR is not considering a ban of fumigants and seeks to address health concerns associated with chloropicrin use through additional mitigation measures.

16. **DPR should allow only TIF tarp applications. Mitzi Shpak, Executive Director, Action Now, et al. (102 additional signatures); Hazel Putney (oral comment), PUEBLO/CAUSE; Anne Katten (oral comment) CRLA.**

DPR's final mitigation measures do not prohibit the use of non-TIF tarps, and include additional restrictions in comparison to applications with TIF tarps. For example, mitigation measures establish a minimum buffer zone of 60 to 100 feet when non-TIF tarps or no tarps are used. When TIF tarps are used, the minimum buffer zone is 25 feet. (Buffer zones for fumigations of chloropicrin in combination with methyl bromide are based on current methyl bromide regulations). DPR predicts the associated reduction in buffer zone distances with TIF tarps will increase their overall use.

17. **Frequency of exposure should be considered when proposing the mitigation measures. Individual nut crop orchards are fumigated once every 20-30 years, which represents less bystander exposure than an annually fumigated field. David Doll, UC Cooperative Extension Farm Advisor.**

DPR agrees exposure to chloropicrin in nut crop orchards is less compared to other crops due to the application frequency. Because tree hole applications tend to result in lower application rates per acre than broadcast and drip applications, DPR based their buffer zone distances and posting requirements on the rate and the number of injections per acre per day. However, because this mitigation is focused on reducing acute exposure, specifically reversible eye irritation, frequency of exposure is not a factor.

18. **Between the acreage and field separation restrictions, it will be difficult to manage planting and growing schedules. Henry Giclas, Senior Vice President, Western Growers.**

DPR is aware that the mitigation measures will likely cause some initial disruption to many agricultural industries. Final mitigation measures incorporate modifications based on public comments received.

DPR has reassessed the overlapping buffer zone requirements. Because flux from TIF applications is minimal based on field studies, the requirement to calculate buffers based on combined acreage of applications is not needed when TIF buffers overlap other applications. The overlapping buffer requirements will only apply to non-TIF and untarped applications.

The final mitigation also includes a change in maximum acreage allowed. There is still a 40 acre maximum that can be treated within a 24 hour period for non-TIF tarp and untarped applications. For TIF tarp applications, the maximum acreage is 60 acres.

19. **DPR's proposed mitigation measures are reasonable. Steven Fennimore, Extension Vegetable Weed Specialist, UC Davis; Jeanette Lomardo (oral comment) California Women for Ag.**

DPR appreciates your feedback on our proposed mitigation measures.

20. **Fumigant pesticides — like chloropicrin — are among the most toxic chemicals used in agriculture, posing a threat to the health of farmworkers and nearby communities, especially children. Because soil fumigants like chloropicrin are applied as gasses at rates of up to 400 pounds per acre, this class of pesticides is nearly impossible to control. Even under the best of circumstances, they drift into neighboring communities — often landing where children are exposed to them in places that they live, learn and play. Chloropicrin drift has already caused many poisoning incidents in California, with records showing that more than 700 people in the past 10 years have been affected. Since many poisonings go unreported, this number is likely the tip of the iceberg. DPR should take swift action and protect community members from this exposure to chloropicrin, while phasing out its use ASAP. Chloropicrin Writing Campaign, Email Comments from individuals (approximately 3886 email comments); Food & Water Watch campaign (3088 email comments).**

DPR thinks that it can develop measures that will protect the communities from unacceptable exposure to chloropicrin. DPR acknowledges historical use of chloropicrin in California has resulted in some unacceptable exposure events, and seeks to prevent future occurrences through mitigation measures. Based on DPR's Pesticide Illness Surveillance Program database for 2002-2011, 33 illness episodes involving chloropicrin occurred that affected 787 bystanders. Two large episodes (in 2003 and 2005) accounted for 488 (61%) of the cases. Most of the symptoms in those two cases involved eye and respiratory irritation, and few of those affected sought medical attention (only 7% of those in the 2003

episode, and only 5% of the incident in 2005). In both those episodes, violations occurred and fines were levied. Of the remaining incidents, a significant number involved violations, and a substantial number of those affected in those incidents suffered only eye and respiratory irritation symptoms and only about 10% of the total number of people affected sought medical attention. These episodes are unacceptable even though they represent a small fraction of the thousands of chloropicrin fumigations that occur each year. Therefore, DPR has developed these mitigation measures to protect people living and working near fields treated with chloropicrin from the adverse health effects of eye and respiratory irritation resulting from acute exposure to chloropicrin. A crucial component of DPR's mitigation process is evaluating the success of the changes put in place. Once DPR's mitigation is in place, we will assess the effect of both the label requirements and DPR's mitigation, with the goal of assuring that chloropicrin can be used safely.

DPR understands your concern over the continued use of chloropicrin, and supports the continued research for fumigant alternatives through the "Nonfumigant Strawberry Working Group" and allocation of grants to groups researching fumigant alternatives. As alternatives become available for large-scale farming, reduced fumigant use may occur. However, the purpose of these mitigation measures is to protect the public from the continued use of chloropicrin. More information on the "Nonfumigant Strawberry Working Group" and grants allocated by the department can be found on DPR's Pest Management Projects web page at <http://www.cdpr.ca.gov/docs/pestmgmt/projects.htm>. Research articles on non-fumigant alternatives can be found at <http://californiaagriculture.ucanr.org/issue.cfm?volume=67&issue=3>

21. **Fieldworkers and other rural residents, including many children, have been made ill by chloropicrin drift exposures – over 1,000 documented cases in the past 20 years. Create a timeline and benchmarks for phasing out chloropicrin. Treat chloropicrin as a carcinogen and implement strong health protections that:**
- a. **Limit the amount of chloropicrin allowed in each county;**
 - b. **Establish protective buffer zones around fumigated fields, large enough to meet child protection levels recommended by state scientists;**
 - c. **Require comprehensive bilingual notification for people who live and work near fields before its use. Californians for Pesticide Reform postcard campaign (approximately 575 postcards).**

DPR agrees unacceptable exposures have occurred in California due to the agricultural use of chloropicrin. DPR seeks to prevent future occurrences through mitigation measures. See the response to Comment 20 above.

The mitigation measures do not include restrictions on the amount of chloropicrin that may be applied in each county because they are not needed and would be ineffective in mitigating acute exposure to chloropicrin. However, chloropicrin is commonly formulated with 1,3-dichloropropene or methyl bromide which do have restrictions on the amount of chemical that may be applied within a township over a specific period of time to mitigate longer term exposures to these other fumigants.

DPR's risk management directive considered exposure to infants, children, and adults, and the buffer zones will provide adequate protection for people of all ages. They range from 25 feet to one-half mile, depending on the region, fumigation method, application rate, and acres. The buffer zones will provide a 95th percentile level of protection (air concentrations will be less than DPR's target concentration at the edge of the buffer zone for 95% of the fumigations). This is the highest level of protection among the options that DPR proposed. Additionally, the U.S. EPA labels allow for reduced buffer zones based on type of tarp used, symmetry of the application rig, use of potassium thiosulfate, water treatments, and soil conditions prior to treatment. DPR has recommended against these reductions; mitigation measures only allow for reductions in buffer zone size when TIF tarps are used.

Current labels require homes and businesses, within a certain distance of a treated field, be notified of a scheduled fumigation or the applicator must conduct site monitoring a minimum of eight times during the 48 hours the buffer zone is in effect. DPR's mitigation requires that, when notification is given, the notification information (specified by the label) must be provided in both English and Spanish.

DPR has concluded that there is not enough evidence to establish that chloropicrin is a carcinogenic hazard requiring mitigation. See responses to Comments 4, 27, 33, 34, 35.

22. **Concerned over tarp failure. He was a drift catcher participant, and is concerned that DPR would not do follow-up monitoring. There was a 26 chicken die off on the 3rd day post application. Manuel Silveira, Healthy Tehama Farms.**

Tarps fail infrequently, and the failures are usually caused by high winds. Due to dilution, air concentrations are lower in high winds compared to low winds, all other factors being equal. Even when a tarp fails in high winds DPR's buffer zones will provide adequate protection. Additionally, tarps usually fail several days after application, when chloropicrin emissions are lower than immediately after application.

DPR reviewed the Tehama CAC report on the Healthy Tehama Farms chicken die off. The final report from Dr. Palmer, of the California Department of Food and Agriculture's Animal Health Branch, stated that no methyl bromide or chloropicrin residue was detected in the birds sent for necropsy. Dr. Palmer was not able to determine the cause of death.

23. **Meetings were not where workers could attend. Michael Marsh (oral comment).**

DPR decided to hold eight community and technical meetings at five locations throughout the state in order to allow all interested parties the opportunity to attend a meeting and give comments. Once the areas with greatest chloropicrin use were identified, DPR worked with the local County Agricultural Commissioners to find meeting sites for each location. Additionally, we worked with worker advocates to ensure that simultaneous Spanish translation would be available at all meetings that would most likely be attended by Spanish-speaking persons. Persons were not limited to providing comment only at the meetings, but were also welcome to submit their comments directly to DPR. DPR published online, and distributed to the counties, the memorandum "Request for Comments

on Chloropicrin Mitigation Proposal” in English and Spanish, which included a schedule of community and technical meetings across California, and directions on how to submit comments. The memorandum and the meeting schedule can be found online at http://www.cdpr.ca.gov/docs/whs/chloropicrin_archives.htm.

24. **DPR is ignoring chloropicrin exposures. 20% of pesticides used are fumigants, which are proven to cause cancer. In the past 10yrs >700 people were exposed in more than 22 drift incidents: 2005- 200 people, 2010- dozens of workers exposed due to ripped tarps, 2012- 2 crews of lettuce workers injured. Some exposures were 1/3 mile away. There was a Santa Barbara exposure incident involving a neighboring school, and the applicators were fined for not following permit conditions. Beverly Bean (oral comment), Community member; Michael Marsh (oral comment), CRLA; Paula Placencia (oral comments), Lideres Campesinas; Demetrio Prunera (oral comment), Community member; Mary Solorio Jacka (oral comment), CRLA; Nancy Edith Gonzalez V. (oral comment), Lideres Campesinas; Angel Sanchez, Community member.**

Only one fumigant registered for use in California is a known carcinogen, 1,3-dichloropropene (1,3-D). DPR does not have sufficient information to find that chloropicrin is also a carcinogen. These mitigation measures are meant to protect those who live and work in around applications from acute exposure that can result in eye and respiratory irritation. The 2005 incident (see response to comment 20 above for more detail on the incident) did cause illnesses resulting from acute exposure. There was also an incident involving a torn tarp in 2010 that resulted in a civil penalty action for violations. In the same year, an incident occurred in Santa Barbara in which violations were found and an action taken. In the 2012, 42 lettuce harvesters reported symptoms related to a chloropicrin application, only 16 were taken for medical care. The farm labor contractor was fined for not taking all crew members for medical attention. No other violations were identified in the 2012 incident.

DPR acknowledges historical use of chloropicrin in California has resulted in some unacceptable exposures. Prior to developing the mitigation measures, DPR reviewed pesticide use reports, pesticide illness reports, and California County permit conditions and considered this information. In addition, DPR reviewed the EPA label changes and determined that there were still exposure scenarios that were not adequately addressed by the measures included on the labels. DPR believes that the additional mitigation measures, which require restrictions beyond those contained on the current labels, provide added measures to protect people living and working near chloropicrin-treated fields from acute exposure that can result in eye and respiratory irritation associated with chloropicrin use. Beyond putting these measures into place, a crucial component of DPR’s mitigation process is evaluating the success of the mitigation. Once DPR’s mitigation is in place, we will assess the effect of both the label requirements and DPR’s mitigation, with the goal of assuring that chloropicrin can be used safely.

DPR has concluded that there is not enough evidence to establish that chloropicrin is a carcinogenic hazard requiring mitigation. See responses to numbers 4, 27, 33, 34, 35.

25. **Chloropicrin needs to be phased out by 2020; it is too volatile, drift prone, and out dated. Farm workers and applicators are not provided training and PPE. Cesar Campos, Coordinator, Central California Environmental Justice Network; Maira Jimenez (oral comment), Lideres Campesinas; Anne Katten, CRLA; Sarah Aird (oral comment), Californians for Pesticide Reform; Jamie San Andres (oral comment), Communities for a New California.**

DPR understands your position and supports the continued research for fumigant alternatives through the “Nonfumigant Strawberry Working Group” and allocation of grants to groups researching fumigant alternatives. As alternatives become available for large-scale farming, reduced fumigant use may occur. However, the purpose of these mitigation measures is to protect the public from the continued use of chloropicrin. More information on the “Nonfumigant Strawberry Working Group” and grants allocated by the department can be found on DPR’s Pest Management Projects web page at <http://www.cdpr.ca.gov/docs/pestmgt/projects.htm>.

Employers are required to comply with all relevant Federal, State, and local regulations associated with pesticide use. California Code of Regulation 3 CCR 6724 “Handler Training,” 6764 “Fieldworker Training,” and 6738 “Personal Protective Equipment,” detail specific requirements employers must comply with prior to allowing employees to handle pesticides or enter pesticide treated areas. Violations of these regulations should be reported to your local Agricultural Commissioner’s office.

26. **Buffer zone signs need to be readable from a distance. DPR should pursue alternatives. Matt Ford (oral comment), Community member; Angel Sanchez, Community member.**

DPR requires all pesticide applications to be compliant with all applicable Federal, State, and local regulations. Title 40 Code of Federal Regulations, Part 170.120 requires all posting signs, including fumigant buffer zone signs, to be readable at a distance of 25 feet and remain posted for the duration of the buffer zone period.

Carcinogenic and Toxicological Issues –

27. **Has DPR determined if chloropicrin causes cancer? Is DPR considering a ban of fumigants? Kirk Larson (oral comment), U.C. Davis Dept. of Plant Sciences.**

Carcinogenicity was reviewed and discussed in DPR’s Risk Characterization Document (RCD), and again in the April 23, 2013 memo from Marylou Verder-Carlos to Christopher Reardon titled “THE RISK MANAGEMENT DIRECTIVE (RMD): RECONSIDERATION OF THE CARCINOGENICITY OF CHLOROPICRIN”. Both of these documents can be found at http://www.cdpr.ca.gov/docs/whs/pdf/dpr_chloropicrin_mitigation_proposal_and_app_1-3.pdf.

DPR, the U.S. EPA, and the National Toxicology Program, evaluated all available information on the carcinogenic potential of chloropicrin and the differing scientific opinions on this subject, and determined the available scientific evidence does not implicate chloropicrin as a carcinogen. See responses to 4, 33, and 35.

DPR is not considering a ban of fumigants at this time, and supports the continued research for fumigant alternatives through the “Nonfumigant Strawberry Working Group” and allocation of grants to groups researching fumigant alternatives. As alternatives become available for large-scale farming, reduced fumigant use may occur. However, the purpose of these mitigation measures is to protect the public from the continued use of chloropicrin. More information on the “Nonfumigant Strawberry Working Group” and grants allocated by the department can be found on DPR’s Pest Management Projects web page at <http://www.cdpr.ca.gov/docs/pestmgt/projects.htm>. Research articles on non-fumigant alternatives can be found at <http://californiaagriculture.ucanr.org/issue.cfm?volume=67&issue=3>.

28. **DPR management needs to recognize that chloropicrin is a hormone disrupter than can cause reproductive cancers. Chloropicrin exposure is linked to asthma. There is a connection between chloropicrin and ADHD, mental disabilities, and cancer. Cesar Campos, Coordinator, Central California Environmental Justice Network; Maira Jimenez (oral comment), Lideres Campesinas; Anne Katten, CRLA; Sarah Aird (oral comment), Californians for Pesticide Reform; Jamie San Andres (oral comment), Communities for a New California.**

The potential for endocrine disruption was discussed in the risk appraisal section of the Risk Characterization Document (RCD) for chloropicrin. In the available animal studies, a few effects were observed in the developmental and reproductive toxicity studies that potentially could be endocrine related effects. However, it is unclear if any of these effects are mediated through endocrine disruption or some other mechanisms. There was also no evidence of neurotoxicity in any of the available animal tests for chloropicrin. If the stakeholders have additional epidemiological evidence of endocrine disruption, ADHD, or mental disabilities associated with chloropicrin exposure, they should submit it to DPR for consideration. DPR has concluded that there is not enough evidence to establish that chloropicrin is a carcinogenic hazard requiring mitigation and is not aware of any epidemiological evidence to support this. The stakeholders are encouraged to submit any epidemiological evidence for cancer as well. See responses to Comments 4, 27, 33, 34, 35.

29. **DPR has incorrectly considered changes in nasal nitric oxide concentration as an adverse effect. It is lung nitric oxide level, or, as identified in current literature, FeNO (Fractional Exhaled Nitric Oxide, nitric oxide levels collected from a sample of lung air) that is the diagnostic tool for risk assessment and clinical management of asthma and other airway inflammatory diseases. Lung nitric oxide levels were unaffected by chloropicrin exposure in the study subjects. The results of Phase 3 (UCSD study) demonstrated that people receiving repeated exposures to concentrations of chloropicrin vapor that produce sensory irritation (four days of 100 ppb and greater or 1 hour) do not develop respiratory irritation. The most sensitive adverse effect in**

humans of low level, repeated exposure to chloropicrin vapor is sensory irritation of the eye and the threshold for that effect is 73 ppb. Chloropicrin Manufacturers' Task Force.

This comment is outside the scope of the mitigation. DPR did not use the nasal nitric oxide end point as its target level in the Risk Management Directive; DPR's 73 ppb regulatory target level was derived by benchmark concentration analysis using the phase 3 study results with eye irritation as an endpoint.

30. **Neither the Centers for Disease Control nor the Federal Environmental Protection Agency classify chloropicrin as a carcinogen based on animal studies and lab assays. The state's Scientific Review Panel (SRP) erred in its conclusion otherwise, and DPR's position that no such designation is supported by science is correct. Jeffrey Jenkins, Professor, PI NPIC, Oregon State University; JJ Levenstein, MD, FAAP, President of MD MOMS, makers of Baby Silk.**

DPR agrees and appreciates your feedback on our mitigation measures.

31. **U.S. EPA has already incorporated safety factors for potentially sensitive groups into the label application regulations. Appropriate consideration has been given to dose, route, duration, and timing of exposure. Science supports that a level of 73ppb should safely limit acute exposure to workers, neighbors and bystanders. Jeffrey Jenkins, Professor, PI NPIC, Oregon State University.**

DPR appreciates your feedback on our proposed mitigation measures.

32. **Supports DPR's RMD position on carcinogenicity. Cynthia Cory, Environmental Affairs Director, California Farm Bureau Federation.**

DPR appreciates your feedback on our proposed mitigation measures.

33. **OEHHA and DPR scientists concluded that chloropicrin is a "potent carcinogen". Mitzi Shpak, Executive Director, Action Now, et al. (102 additional signatures).**

In February 2010, DPR issued the final version of the "Evaluation of Chloropicrin as a Toxic Air Contaminant, Part B Human Health Assessment" (TACHHA). Based upon peer review recommendations of the Office of Environmental Health Hazard Assessment and the Scientific Review Panel, this revised final document included an analysis justifying the treatment of chloropicrin as a carcinogen and the quantification of its carcinogenic potency. Before preparing the Risk Management Directive in December 2010, DPR reviewed the evidence and analysis of the carcinogenic effects of lifetime exposure to chloropicrin and determined that the conclusion of the TACHHA was not adequately supported and that the evidence on the carcinogenicity of chloropicrin was *equivocal*. The term "*equivocal* evidence of carcinogenicity" generally denotes that there is not enough evidence to establish a clear manifestation of a carcinogenic hazard. A detailed description of this review is the subject of the April 23, 2013 memo from Marylou Verder-Carlos to

Christopher Reardon titled “THE RISK MANAGEMENT DIRECTIVE (RMD): RECONSIDERATION OF THE CARCINOGENICITY OF CHLOROPICRIN”. This memorandum is included as Appendix 3 in the Draft Chloropicrin Mitigation Proposal found at

http://www.cdpr.ca.gov/docs/whs/pdf/dpr_chloropicrin_mitigation_proposal_and_app_1-3.pdf. Therefore, DPR’s mitigation measures address only the acute adverse effects and chloropicrin is not considered a carcinogen.

34. **Ms. Jessop’s final paragraph [in the Memo to Sheryl Beauvais regarding carcinogenicity of chloropicrin] fails to provide any review of the ‘prior’ evidence that of the likelihood that chloropicrin is carcinogenic before proceeding to her inference that the mouse observations fail to provide evidence that this compound is likely to be a ‘strong’ carcinogen. The downplayed view of the evidence for carcinogenicity of chloropicrin from a recent DPR “Risk Management Directive” ignores the very substantial difficulties in long term animal testing of a compound with the high level of reactivity and conventional toxicity that chloropicrin has. The maximum exposure levels used need to be restricted to levels that allow the animals to survive long enough to be assessed for tumors. Several of the animal studies that have been done have been considered inconclusive due to excessive mortality before the planned ends of the studies. In the inhalation studies used for the cancer potency assessment, the maximum exposure level used was only 1 ppm.**

The idea that there can be any reasonable chance of a population threshold for carcinogens with genetic activity has been generally dismissed by professionals with knowledge of toxicokinetics, the dynamics of the processes that lead to the unrepaired DNA lesions and mutations that lead to cancer. It is discouraging to find such a misperception in an apparently influential management document. DPR should reverse this inappropriate conclusion of fact and consider management options that do not inappropriately impose what are likely to be appreciable risks on workers and bystanders downwind of sites of chloropicrin use. Dale Hattis, Ph.D. Clark University.

A review of “prior” evidence in that memo is unnecessary, as the RCD provided a thorough review of the strengths and weaknesses of all available data. Ms. Jessop’s memo addresses only the use of the Bieler-Williams Poly-3 Trend Test with a specific data set that was evaluated in DPR’s Risk Characterization Document. She was asked to determine the appropriateness of the test, with this specific data set, and to interpret the test result.

In her April 23, 2013 memorandum, Dr. Verder-Carlos discusses DPR’s review of the evidence and analysis of the carcinogenic effects of lifetime exposure to chloropicrin. In response to the conclusion that chloropicrin is a "carcinogen with genetic activity", she points out that while in vitro tests yielded positive results, those results were "either not dose-dependent nor reproducible," and in vivo tests were negative (pages 4-5). Also, she noted (page 8) that the comprehensive risk assessment stated that a genotoxic mode of action was assumed by DPR:

“Although the increase in tumors was not dramatic in either carcinogenicity study and all the in-vivo tests were negative, a “health protective” assumption was made that a

genotoxic mode of action was involved based on the electrophilic structure and the positive in-vitro genotoxicity tests.

DPR is not claiming that a genotoxic carcinogen has a threshold, but that evidence supporting the conclusion that chloropicrin is a genotoxic carcinogen is equivocal (i.e., DPR concludes that there is insufficient evidence to support that chloropicrin is a genotoxic carcinogen.).

35. **DPR’s target level of 73 ppb is too high. Children are not protected by the proposed measures. DPR and CalEPA concluded that chloropicrin is a carcinogen. In the Drift catcher study, high levels of drift were detected. Detected levels indicate that children are 76 times more likely to develop cancer over their lifetimes (cites OEHHA). Paul Towers, PANNA; Sarah Aird, Californians for Pesticide Reform, Kenia Acevedo, CRLA.; Sam and Melissa Sleezer, Healthy Tehama Bend Farms.**

In February 2010, DPR issued the final version of the “Evaluation of Chloropicrin as a Toxic Air Contaminant, Part B Human Health Assessment” (TACHHA). Based upon peer review recommendations of the Office of Environmental Health Hazard Assessment and Scientific Review Panel, this revised final document included an analysis justifying the treatment of chloropicrin as a carcinogen and the quantification of its carcinogenic potency. Before preparing the Risk Management Directive in December 2010, DPR reviewed the evidence and analysis of the carcinogenic effects of lifetime exposure to chloropicrin and determined that the conclusion of the TACHHA was not adequately supported and that the evidence on the carcinogenicity of chloropicrin was equivocal. The term “equivocal evidence of carcinogenicity” generally denotes that there is not enough evidence to establish a clear manifestation of a carcinogenic hazard. In July 2010, U.S. EPA convened a Cancer Assessment Review Committee to review the data and evaluate whether chloropicrin should be categorized as a carcinogen. The committee concluded that it is not likely to be carcinogenic to humans. Additionally, the Carcinogen Identification Committee convened by the California Environmental Protection Agency, also concluded there is not enough evidence to categorize chloropicrin as a carcinogen. The conclusion is also supported by the World Health Organization, the European Food Safety Authority and Health Canada.

36. **Concerned over workers and their children. Expectant mothers working in the fields have children with disabilities. One commenter’s husband died of pulmonary fibrosis, and she has asthma. Her children have asthma. How are fieldworkers’ and communities’ costs of health care associated with exposure factored into these measures? Audelia Garcia (oral comment), Canpesinas; Ramona Felix (oral comment); Martha Morena, Juana Hernandez, Sylvia Berrones-Treveno, Elizabeth Heron (all oral comments), Lideres Campesinas.**

When developing the mitigation measures, DPR reviewed a number of documents, including pesticide use reports, pesticide illness reports, and California County permit conditions. DPR also observed a number of chloropicrin applications, talked with growers and applicators, CAC staff familiar with local needs for fumigant use, and with worker

advocates. Mitigation measures developed by DPR are based on reasonable measures and practical solutions designed to reduce the risk of bystander exposure. DPR is mandated to continuously evaluate mitigation measures by monitoring illnesses and working collaboratively with county agricultural commissioners, county public health and environmental health offices. If illnesses occur in relation to pesticides, DPR will work collaboratively with local and state public health offices to address problems and find solutions.

37. **Concerned over tarp failure. Notes wife dying of cancer, and has watched other strawberry workers, babies, and unborn babies die. Dennis Apel (oral comment), Community member.**

Tarps fail infrequently, and the failures are usually caused by high winds. Due to dilution, air concentrations are lower in high winds compared to low winds, all other factors being equal. Even when a tarp fails in high winds DPR's buffer zones will provide adequate protection. Additionally, tarps usually fail several days after application, when chloropicrin emissions are lower than immediately after application.

Lack of Alternatives –

38. **Almonds are a permanent crop with a lifecycle of 25-30 years. Chloropicrin is an essential tool when planting or replanting an orchard as it is imperative for the long term health and production potential of the orchard that the soil is healthy and free of pests. At this point there is no commercially viable alternative for chloropicrin. Chloropicrin is most often used in conjunction with 1,3-dichloropropene (Telone C35) as a means to control both nematodes and fungi. Telone already has significant restrictions on use. Methyl bromide has been banned and is virtually unavailable for soil fumigation in almonds. 2013 is the last year that growers will have access to methyl bromide under the Critical Use Exemption; as of 2014 U.S. EPA has denied allocation of CUE methyl bromide for soil fumigation of almonds as well as other perennial crops including walnuts, stone fruit, and grapes. The California Almond Industry is seeking root stocks with resistance, but it will be decades to breed rootstocks with resistance to a wide range of soil pests. Currently there are some rootstocks with some resistance but those rootstocks have other cultural problems: the root stock with some resistance is not compatible with the Nonpareil variety of almond, the most valuable variety accounting for 39% of the crop.**

The need for a viable soil fumigation tool is critical for the almond industry moving forward. There is less "virgin" ground available for almond planting in the Central Valley so the need for soil fumigants will be increasing overall. Prunus replant disorder is a serious problem when planting almonds after almonds, or planting related and susceptible Prunus crops. The USDA estimates that as much as 65% of Prunus orchards have disease-based replant disorder. Kelly Covello, President, Almond Hullers and Processors.

See response to Comment 39 below.

39. **Chloropicrin has proven to be one of the most successful tools to prevent and treat replant problems such as Crown Gall and Prunus Replant Disease. A study conducted By Dr. Karen Klonsky, *Economic Performance of Alternative Pre-plant Fumigation for Almonds and Peaches in California*, showed chloropicrin has and will continue to be one of the most important and most effective strategies growers have for successful replants. Alternatives do not perform as well as fumigants for tree crops. Aimme T. Brooks, Director Regulatory Affairs, Western Agricultural Processors Association; David Doll, UC Cooperative Extension Farm Advisor.**

[Response to Questions 38 and 39.]

The Department's mitigation measures do not prohibit the use of chloropicrin in almond orchards, but place additional restrictions on these applications.

40. **No economically viable alternatives to fumigants. Growers will be financially hurt by having to either comply with the measures or not use chloropicrin. Rod Koda, (grower) Shinta Kawahara Co.**

See response to Comment 43 below.

41. **Despite millions of dollars of government and privately funded research, there are currently no viable commercial alternatives to soil fumigation. Chloropicrin Manufacturers' Task Force; Paul Giboney, PCA, M. Caratan Inc.; Norm Grot, Monterey County Farm Bureau.**

See response to Comment 43 below.

42. **To date, we have not found alternatives that perform as well as fumigation. I have tested a dozen alternatives including steam, biological control agents, soil amendments, nematicides, and different fertility programs. A literature review would reveal nearly 70 years of work on replant disease of Punus sp., and would conclude with similar findings. David Doll, UC Cooperative Extension Farm Advisor.**

See response to Comment 43 below.

43. **More funding and support for alternatives. Paul Towers, PANNA; Sarah Aird, Californians for Pesticide Reform, Kenia Acevedo, CRLA; Matt Ford (oral comment), Community member; Angel Sanchez, Community member.**

[Response to Questions 40, 41, 42, and 43.]

In 2013, the Department allocated several grants to support continued research for alternatives that perform as well as fumigants. DPR convened a diverse working group of scientists and other specialists (The Nonfumigant Strawberry Production Working Group) to establish focus areas for research. The Working Group developed an Action Plan that

specified research priorities for advancing the development of management tools and practices to control soilborne pests in strawberry fields without fumigants.

<http://www.cdpr.ca.gov/docs/pressrls/2013/130409.htm>

The Action Plan complements another of DPR's research partnerships focusing on strawberries, this one with the California Strawberry Commission. The focus of the research partnership is to develop strawberry growing techniques using peat or substances other than soil. This is a \$500,000, three-year research project, announced in March 2012 that is exploring ways to grow strawberries in peat or substances other than soil.

<http://www.cdpr.ca.gov/docs/pressrls/2012/120307.htm>

It also complements DPR's research grant program, which awards funds for projects that research production practices that reduce reliance on fumigants and other high-risk pesticides. Two fumigant-related grants were funded for 2013 and 2014: "Methyl bromide alternatives for strawberry nurseries" and "Reducing dependence on pre-plant soil fumigation in almond and stone fruit orchards".

http://www.cdpr.ca.gov/docs/pestmgt/grants/research/summaries/2013_awards.htm

44. **Before regulations are implemented that go beyond scientific evidence, commercially viable alternative products to chloropicrin must be available to growers. Renee Pinel, President/CEO, Western Plant Health Association.**

The Department's mission is to protect human health and the environment by regulating the sale and use of pesticides. The final mitigation measures are based on the most complete and accurate scientific studies available at this time. Based on DPR's Risk Management Directive, DPR determined that acute exposures have the potential to be above a level of concern that could cause eye and respiratory irritation and that more protective measures are required. This document can be reviewed at

<http://www.cdpr.ca.gov/docs/emon/pubs/chloropicrin/directive.pdf>.

Model-Related Issues –

45. **It is important to consider that PERFUM, while a reliable tool, is a mathematical model with attendant uncertainties. Any result from PERFUM also needs to be considered in the context of the use history of the chemical, particularly one in commerce as long as chloropicrin. Application Method Groupings (untarped, poly, TIF) are over generalized and created unreasonable buffer zones. CMTF view is application groupings over-simplify all of the types of chloropicrin applications and in doing so makes unrealistic assumptions about application conditions, resulting in unreasonably large buffer zones (p. 4, CMTF). For example, pooling drip and shank applications obscures the soil condition differences between the two application types. Citing Barry 2013, untarped shallow emissions were greater than untarped shank emissions. Barry 2013 does indicate injection depth is currently being modeled with HYDRUS (not published). Statistics aside, CMTF proposes five application categories (p. 5, CMTF):**

- TIF (all methods, consistent with the DPR proposal)
- Non-TIF (broadcast, strip, or bed, shallow or deep)
- Non-TIF drip (tarped drip, with non-TIF tarp)
- Nontarped shank (broadcast, strip, or bed)
- Nontarped buried drip (drip tape buried at least 5 inches)

Chloropicrin Manufacturers' Task Force; Michael Stanghellini, Director of Research and Regulatory Affairs, TriCal Inc.

Based on a reanalysis of the field monitoring data, DPR has established the following fumigation method groups:

1. 60% buffer credit tarp (TIF) broadcast shank injection
2. 60% buffer credit tarp (TIF) bed injection
3. 60% buffer credit tarp (TIF) strip deep injection
4. 60% buffer credit tarp (TIF) drip
5. Non-60% buffer credit tarp (non-TIF) broadcast shank injection
6. Non-60% buffer credit tarp (non-TIF) bed injection
7. Non-60% buffer credit tarp (non-TIF) strip injection
8. Non-60% buffer credit tarp (non-TIF) drip
9. Untarped broadcast shallow shank injection
10. Untarped broadcast deep shank injection
11. Untarped bed injection
12. Untarped drip

46. **Fluxes estimates for two of the untarped applications are incorrect due to incorrect application rate values and references (p. 4-5, CMTF). Buffer zones, and underlying model are incorrect due to miscalculated application rates used in two studies (pp. 6-8, CMTF; DPR Vol. #0199-0137). DPR cited the broadcast rate as 47.7 and 52.0 lbs/gross acre ([Appendix 1, Barry 2013](#)). The application rates were 142 and 155 lbs/gross acre. It is possible that DPR mistakenly treated the rates of 142 and 155 as treated acre rates and converted them to broadcast equivalent rates. If this is the case, the flux emissions are 67% smaller than the values used to fit the models. Chloropicrin Manufacturers' Task Force; Michael Stanghellini, Director of Research and Regulatory Affairs, TriCal Inc.; Richard Reiss, Exponent Inc. (also of Reiss and Griffen 2006).**

DPR agrees with the commentor. The application rates in the volume were misinterpreted. The application rates for the two untarped applications should be 142lb/ac and 155 lb/ac. The buffer zones were adjusted accordingly.

47. **DPR should re-run the PERFUM model using harmonized start times of the input flux datasets, since the vast majority of fumigations are done in the morning. Due to differing weather conditions between night and day, fluxes of the same magnitude would yield differing buffer zones depending on the time of day they occurred. Having an early morning start time, would more realistically model the time of day the fluxes would occur and yield more appropriate buffer zones. Chloropicrin Manufacturers' Task Force; Michael Stanghellini, Director of Research and**

Regulatory Affairs, TriCal Inc.); Richard Reiss, Exponent Inc. (also of Reiss and Griffen 2006).

Shifting all flux profiles to a harmonized start time can only be justified if it is verified that the flux profiles are consistent in pattern from the start of each application without regard to the time of day the application was started. The analysis of polyethylene tarp flux data shows that this feature is not present in the flux profiles. The polyethylene applications were analyzed separately because this is the main group affected by this proposal. The maximum flux for the majority of the polyethylene applications occurs at or close to 12:00 hrs, independent of the application time. This feature argues against harmonizing the start times because that maximum flux will not occur at the correct time of day and infers that the timing of the maximum flux is not reliably related to the start time for a particular application.

48. **The broadcast equivalent rate and not the treated acre rate should be used when developing the PERFUM modeled buffer zones. Based upon DPR supplied PERFUM modeling files, 350lbs/acre was used for modeling all application methods (p 11, CMTF). On current labels some applications methods do not allow for 350lbs/acre broadcast equivalent application rates (e.g. untarped broadcast 175lbs/a max). CMTF proposes that the studies with scenarios with extrapolated application rates above current label rates be excluded when developing the buffer zones. New aggregate buffer zone distributions are generated using only datasets with legally allowable application rates. 15/28 applications ([Appendix 2, Barry 2013](#)), should not have been extrapolated to 350lbs. (questions are why in appendix 2, were the flux rates transformed to reflect 350lbs/acre applications rate emissions and how does changing input application rates change PERFUM model results?). Chloropicrin Manufacturers' Task Force.**

DPR revised the fumigation method groupings so this comment was addressed by the revision.

49. **CMTF would like confirmation that the Phoenix, AZ datasets (DPR Vol#0199-0072) were not used for generating the buffer zone distributions, as the example PERFUM file contained those data (footnote 4, p. 13, CMTF). The Phoenix AZ studies did not conform to GAP standards (soil sealing practices were not done). Chloropicrin Manufacturers' Task Force.**

The four Arizona applications were removed from the analysis because, although the study in which the applications were made met acceptance criteria, the applications did not meet the current Good Agricultural Practices required on the federal label.

50. **Establish different buffer zones for different regions based on weather differences? How many regions and how to define boundaries? Reliance on coastal weather data not representative of inland weather conditions resulting in unnecessarily large buffer zones for inland growers. It is imperative that DPR assist tree/vine growers by developing workable conditions for non-tarped deep shank applications. As one**

approach, DPR should develop buffer zones based on the Bakersfield, CA meteorological data file for chloropicrin applications in the San Joaquin Valley and other areas that are not well-represented by the Ventura meteorological data file. Using two regionally-applicable buffer zone modeling approaches is more scientifically valid than using the MET data file that results in the largest buffer zones and adopting those conditions statewide. Michael Stanghellini, Director of Research and Regulatory Affairs, TriCal Inc.; Cynthia Cory, California Farm Bureau Federation.

In its updated analysis, DPR calculated buffer zones using historical weather data from four additional stations in addition to the Piru (Ventura County) station: Belridge (Kern County), Manteca (San Joaquin County), Salinas (Monterey County), Tule Lake (Siskiyou County). These five stations were selected for several reasons.

- They are in high-use regions of chloropicrin.
- They represent different geographic areas.
- They have complete data for a 5-year period.

Based on this analysis, DPR has developed one set of buffer zones for coastal counties based on Ventura County weather data, and a second set of buffer zones for inland counties based on San Joaquin County weather data. Buffer zones based on Ventura County weather data were larger than Monterey County in virtually all cases, so selecting Ventura adds a level of protection for most areas. Buffer zones based on Kern, San Joaquin, and Siskiyou weather were similar distances. There was no single weather location that resulted in consistently larger buffer zones. Each of the three locations had several combinations of fumigation method, application rate, and acreage with the largest buffer zone. DPR selected San Joaquin County as the most representative location to develop buffer zones for all inland counties.

51. **Advocates for the use of the whole field method for calculating buffer zones rather than the maximum concentration distribution. The whole field approach better approximates exposure probabilities and analogous to regulations of other exposure scenarios (pp. 2-3). Supports EPA’s use of the whole field method based upon the exposure endpoint of eye irritation (reversible) and the use of the maximum concentration distribution for irreversible exposure endpoints (p. 6). The whole field versus maximum concentration dichotomy provides regulators with a means of accounting for the severity of the endpoint. If DPR were to regulate all fumigants in exactly the same manner, it would create a situation where the nature of effect had no impact on the risk decision. DPR should adopt the lower maximum concentration derived percentiles or use the whole field distribution for regulation. Richard Reiss, Exponent Inc. (also of Reiss and Griffen 2006).**

DPR has written a comprehensive memorandum on whole field versus maximum direction buffer zones and the protection levels each offers. The choice between whole field and maximum direction is a policy decision. See Barry and Johnson (2007) for details. http://www.cdpr.ca.gov/docs/emon/pubs/ehapreps/analysis_memos/1959_segawa.pdf

52. **Found the buffer zone rankings and probabilities of exceeding the reference level difficult to interpret, making translation into policy problematic. Probabilistic risk assessments have the goal of better characterizing variability in the data and uncertainty in understanding the processes that determine risk, in this case fumigant flux and bystander exposure. While DPR was comprehensive in modeling fumigant flux, this is a worst case approach which assumes that a person would be standing directly downwind during a specific “moment in time” soon after application on days where the weather conditions would produce the greatest flux. Associating buffer zone distances with the probability of exposure exceeding the 73 ppb reference level should be based on the totality of the proposed mitigation measures which should greatly reduce the likelihood a person would be standing directly downwind soon after application, i.e., the more realistic joint probability between human behavior and fumigant flux. Jeffrey Jenkins, Professor, PI NPIC, Oregon State University; Rod Koda, (grower) Shinta Kawahara Co.**

DPR’s probabilistic analysis accounts for the variability in weather conditions as well as variability in flux. Actual daily Ventura weather data was used, not worst case weather. Plus, DPR has evaluated weather data from four other stations. The buffer zones are not for “a moment in time.” The averaging time is 8 hrs: the wind speed and direction changes for each of the 8 hours in a particular averaging period, the weather data is for 5 years. The analysis shows that the maximum 8 hr flux, which determines the buffer zone length, can occur anywhere from immediately following the application to days later. The maximum 8 hr flux can occur during the day or at night, independent of what time of day the application was begun. The many factors that could significantly affect the buffer zone lengths were included in the modeling by virtue of the method used to develop the buffer zone distributions for each of the groups.

Buffer zones –

53. **Buffer zone sizes and time restrictions will take land out of production and be costly for orchard growers. The data do not support the need for these restrictions. Tarping is not a common practice in orchards. When establishing an orchard, nut growers use untarped, deep fumigation method. Deep placement of the fumigant through multiple shanks is necessary to deliver the fumigant to where the pests are. Current cultural practices and equipment do not have tarp laying capabilities. The size of the buffer zones for untarped applications will significantly increase costs and disrupt critical planting windows. Aimme T. Brooks, Director Regulatory Affairs, Western Agricultural Processors Association; Abhi Kulkarni, Assistant Technical Director, California Walnut Commission; Adrian Zendejas, Grower, Desert Mist Farms; Paul Giboney, PCA, M. Caratan Inc.; Bruce Lindauer, Arthur Saikhon, Seeley Mudd, Brendon Flynn, Pacific Farms & Orchards Inc.; Mark Mason, Grower, Huntington Farms; Vito Chiesa, District 2 Supervisor, Stanislaus County.**

Based on its risk assessment and other information, DPR’s risk management decision concludes that there are unacceptable exposures to chloropicrin in several instances.

DPR has updated its analysis and calculated buffer zones for untarped deep applications based on the single deep injection study available, and evaluated weather data from five stations. However, even with these modifications, the buffer zones for untarped-deep applications will be approximately 75% of those originally proposed by DPR.

In most cases, growers and applicators will need to change fumigation practices to reduce exposures to acceptable levels. Assuming the application rate cannot be reduced, the buffer zone can be reduced by fumigating in smaller blocks and/or changing fumigation method. Several fumigation methods with lower emissions and smaller buffer zones can be used for orchards instead of broadcast untarped, including broadcast tarp (60% credit tarp or no credit tarp), strip tarp, strip untarped, and GPS-targeted fumigation (with or without a tarp).

54. **Proposed buffer zones are unnecessarily restrictive especially for non-tarped applications and applications that do not use TIF. CDPR should follow U.S. EPA buffer zones, including the credits, with the exception of applications using TIF tarps. When comparing DPR's proposed chloropicrin buffer zones for untarped deep applications at the 95th percentile they are in fact larger than the buffer zones required for the use of methyl bromide, which is virtually banned unless being used under the critical use exemption for almond replants. So these proposed buffer zones are a defacto ban of the use of chloropicrin as it will be more difficult to use than a fumigant that has been banned.**

Buffer zones are fumigant specific. The threshold level and averaging times of methyl bromide and chloropicrin are different. Thus, the buffer zones should not be expected to be similar. Also, methyl bromide is being phased out due to its ozone depletion effects, not its toxic effects.

55. **This is an example of the impact of DPR's potential selection of chloropicrin buffer zones based on the 95th percentile, using a moderate rate of chloropicrin (150 lbs/acre) on a 40 acre block of almonds. A block of land approximately 390 acres will be needed to accommodate this buffer zone, with a total buffer perimeter exceeding 3 miles. Some counties are considering requiring buffer signage every 200 feet; this would mean posting approximately 80 signs. Aimee T. Brooks, Director Regulatory Affairs, Western Agricultural Processors Association.**

See response to Comment 53 above. The buffer zone size and number of signs can be minimized by fumigating a field in several blocks over several days.

56. **DPR should keep 30/60 ft buffer zones (for MeBr?). Patrick Griffin, Agriculture Commissioner, Siskiyou Co.**

See response to Comment 57 below.

57. **CMTF would like justification for the 60-100 ft minimum buffer zone for non-TIF and no tarp applications (p.13, CMTF). Chloropicrin Manufacturers' Task Force.**

[Response to Questions 56 and 57.]

The minimum buffer zone distance is a management decision due to uncertainties in the buffer zone calculations. DPR assumed the following for its buffer zone calculations:

- All fields are square.
- Flux is the same across the entire field.
- Flux is the same for the entire monitoring period (6-12 hours).

All of these assumptions are simplifications of actual conditions, but they greatly simplify the calculations. These assumptions also minimize the number of buffer zone tables that are needed, making compliance and enforcement easier. However, these assumptions also add uncertainty to the buffer zone calculations. The minimum buffer zone helps compensate for these uncertainties.

58. **In terms of emissions and safety, deep shank injections should not be treated the same as bedded drip applications. Deeper injections are safer than shallow. David Doll, UC Cooperative Extension Farm Advisor.**

See response to Comment 53 above.

59. **DPR needs to allow a two year moratorium on implementing proposed buffer zone requirements. The two years will be used to evaluate the effects of the U.S. EPA buffer zones. Husein Ajwa, UC Cooperative Extension Specialist.**

DPR's buffer zones will go into effect in 2015, two years after U.S. EPA's label changes.

60. **DPR should adopt the lower buffer zones for the TIF tarped application so if U.S. EPA determines similar buffer zones are applicable for TIF they could be readily implemented in California. Kelly Covello, President, Almond Hullers and Processors; Husein Ajwa, UC Cooperative Extension Specialist; Robert Roy, President and General Counsel, Ventura County Agricultural Association; Tiffany Martinez, Shasta County Farm Bureau; Bernard Olsen, President, San Luis Obispo County Farm Bureau; Karri Hammerstrom, President, California Women for Agriculture; Richard Schmid, President, Riverside County Farm Bureau; Ryan Jacobsen, CEO, Fresno County Farm Bureau; Sam Mudd, President, Tehama County Farm Bureau.**

DPR agrees that applications with TIF tarps have significant reductions in off-site exposures. Therefore DPR is not increasing buffer zones beyond label requirements for TIF applications.

61. **Proposed buffer zones are not large enough. DPR should adopt buffer zones that are: large enough to protect to the DPR and OEHHA exposure limits (2.7ppb); a minimum ½ mile buffer zone for fumigations near schools, and a flat ½ mile buffer zone around all TIF tarp applications. Buffer zone signs need to be readable from a distance. Buffer zones should factor in tarp failure. There are no regulations for catastrophic tarp failure. Mitzi Shpak, Executive Director, Action Now, et al. (102**

additional signatures); Paul Towers, PANNA; Sarah Aird, Californians for Pesticide Reform, Kenia Acevedo, CRLA; Sam Sleezer, Healthy Tehama Bend Farms.

The buffer zones will provide adequate protection. A person on the downwind side of the buffer zone perimeter will be exposed to no more than DPR's target concentration of 73 ppb for approximately 95% of the applications. DPR considers this an acceptable level of risk. Current label requirements follow DPR's and EPA's standards for sign readability. The label requirements for emergency response adequately address tarp failure; adjustments to the buffer zone are not needed.

62. **Support the TIF tarp buffer zones, but not all growers can use TIF tarps and the non-TIF tarp buffer zones are too restrictive. Remote and isolated field should have smaller buffer zones. Henry Giclas, Senior Vice President, Western Growers.**

DPR has revised the buffer zones after correcting for errors, and they are smaller than originally proposed. DPR used all of the available scientific data for its buffer zone calculations. Buffer zone distances are based on emissions and other factors that affect air concentrations. Population density or remoteness of a field is not a factor that affects air concentrations. These methods are consistent with ones used for other fumigants. Additionally, the peer reviewers supported the methods used by DPR.

63. **DPR should conduct a more refined data analysis in order to reduce buffer zone sizes. Gary Obenauf, Agricultural Research Consulting.**

All chloropicrin flux data available has been used specifically as it occurred in the field studies of chloropicrin applications that were made according to commercial practice. DPR has subdivided the three fumigation method groups originally proposed. The many factors that could significantly affect the buffer zone lengths were included in the modeling by virtue of the method used to develop the buffer zone distributions for each of the groups. DPR has updated its analysis to include weather data from an additional four sites.

64. **Chloropicrin is not necessary for food production. Buffer zones will not work as chloropicrin will move for miles, and will persist in the soil and seep out through time. Human safety of soil after application is a concern. How long does chloropicrin persist in the soil? Is this testable? Matt Ford (oral comment), Community member; Angel Sanchez, Community member.**

DPR used monitoring data and modeling to estimate exposures off-site from a fumigated field. DPR is establishing buffer zones that are health protective. DPR's buffer zone distances, duration of buffer zones, and time requirements before tarp removal, account for chloropicrin's offsite movement and persistence in the soil.

Buffer Zone Percentile –

65. **Buffer zones greater than the 80th percentile are unwieldy. DPR should re-examine the model inputs and assumptions that yielded the exaggerated buffer zone**

projections. Hebe Bradley, Norcal Nursery, California Strawberry Nurserymen's Association; David Cox (oral comment), L.E. Cooke Co.

DPR has corrected several errors in the data from the field study reports, the weather data used for modeling, and its buffer zone calculations. These error corrections resulted in smaller buffer zones.

66. **Buffer zone distances are of concern. 80% seems outrageous; does not protect public safety. 95% is still too little. Would like to see 100%ile protective buffer zones. Beverly Bean (oral comment), Community member; Michael Marsh (oral comment), CRLA; Paula Placencia (oral comments), Lideres Campesinas; Demetrio Prunera (oral comment), Community member; Mary Solorio Jacka (oral comment), CRLA; Nancy Edith Gonzalez V. (oral comment), Lideres Campesinas; Angel Sanchez, Community member; Paul Towers, PANNA; Sarah Aird, Californians for Pesticide Reform, Kenia Acevedo, CRLA; Cesar Campos, Coordinator, Central California Environmental Justice Network; James Dismukes (oral comment), Community member; Anne Katten, CRLA.**

See response to Comment 68 below.

67. **Recommends adoption of EPA buffer zones because these buffer zones are representative of a middle value between the 95% and 80%ile tables. Cynthia Cory, California Farm Bureau Federation.**

See response to Comment 68 below.

68. **DPR should adopt the 80th percentile buffer zones while evaluating the effects of U.S. EPA label changes. Michael Stanghellini, Director of Research and Regulatory Affairs, TriCal Inc.**

[Response to Questions 66, 67, and 68.]

DPR's policy decision to select the 95th percentile (concentration at the buffer zone distance is less than DPR's target concentration for 95% of the applications) is consistent with other fumigants.

The U.S. EPA buffer zones were developed using Florida meteorological data and the whole field approach. Thus, for a given application rate and acreage combination, it cannot be assumed that the U.S. EPA buffer zones will always be the middle value between the 95% and 80% DPR buffer zones. DPR staff has previously examined the relationship between the whole field percentile and the maximum direction percentile and found that it is not possible to know what the individual field buffer zone failure rate is for a given whole field percentile buffer zone. For the comprehensive analysis of the relationship between whole field and maximum direction percentiles see:

http://www.cdpr.ca.gov/docs/emon/pubs/ehapreps/analysis_memos/1959_segawa.pdf.

69. **Evaluate field separation requirements? Proposed requirements (buffer based on combined acreage if fields have overlapping buffers for 36 hrs) are based on current label and methyl bromide requirements. A more detailed evaluation could result in less stringent or more stringent requirements. Cultural practices in tree nuts include starting the application in the morning and end before or shortly before noon as to capitalize on the best meteorological conditions of the day for applicators. Essentially this turns DPR's 36 hour requirement into a 48 hour prohibition, thus negatively impacting cost and overall efficiency for growers, and resulting in lower productivity. The current label mandated 12 hour limit is de facto an 18-20 hour limit. DPR's proposal would drag out applications for weeks. Aimme T. Brooks, Director Regulatory Affairs, Western Agricultural Processors Association; Louis Calcagno, Supervisor 2nd District, Monterey County; Claire Wineman (oral comment), Grower-Shipper Association of Santa Barbara and San Luis Obispo Counties; Bruce Lindauer, Arthur Saikhon, Seeley Mudd; Robert Roy, President and General Counsel, Ventura County Agricultural Association; Tiffany Martinez, Shasta County Farm Bureau; Chloropicrin Manufacturers' Task Force, Husein Ajwa, UC Cooperative Extension Specialist; Henry Giclas, Senior Vice President, Western Growers; Bernard Olsen, President, San Luis Obispo County Farm Bureau; Karri Hammerstrom, President, California Women for Agriculture.**

DPR has reassessed the overlapping buffer zone requirements. Because flux from TIF applications is negligible based on field studies, the requirement to calculate buffers based on combined acreage of applications is not needed when TIF buffers overlap other applications.

The overlapping buffer requirements will only apply to non-TIF and untarped applications.

70. **The combined acreage proposal will not work in the real world. Combined acreage buffer zones are difficult to implement. Neighboring fields probably will not be applying at the same rate or using the same tarps. The application practices may largely be dictated by what a neighboring grower is doing. TIF tarped applications should be treated as stand-alone application, regardless of whether there are neighboring applications. (e.g. TIF applications could occur in the buffer zone of non-TIF applications). The TIF user get penalized with a larger buffer zone because his/her neighbor decided to use polyethylene film. As long as TIF is used, those fields should be considered stand-alone events. Michael Stanghellini, Director of Research and Regulatory Affairs, TriCal Inc.**

See response to Comment 69 above.

71. **The impact of time restrictions on overlapping buffer zones if implemented without a sound scientific basis would create burdens for growers that would significantly impact planting and harvesting windows. With only a finite fumigation window, the size of the buffer zones and overlap restrictions will make it difficult to coordinate fumigations among neighboring farms. Adrian Zendejas, Grower, Desert Mist**

Farms; Paul Giboney, PCA, M. Caratan Inc.; Renee Pinel, President/CEO, Western Plant Health Association.

See response to Comment 69 above.

Maximum Acreage Restriction –

72. **Increase max block size? Proposed max of 40 acres in 24 hrs is based on methyl bromide, size of buffer (4700 ft max), and field separation requirements. Increasing block size could affect these other requirements. 40-acre daily limit would lower yield, productivity, and efficiency. DPR should use the U.S. EPA maximum acreage. Bruce Lindauer, Arthur Saikhon, Seeley Mudd; Robert Roy, President and General Counsel, Ventura County Agricultural Association; Tiffany Martinez, Shasta County Farm Bureau; Bernard Olsen, President, San Luis Obispo County Farm Bureau; Karri Hammerstrom, President, California Women for Agriculture; Gary Obeauf, Agricultural Research Consulting; Richard Schmid, President, Riverside County Farm Bureau; Ryan Jacobsen, CEO, Fresno County Farm Bureau; Sam Mudd, President, Tehama County Farm Bureau.**

DPR will allow TIF applications up to 60 acres, since the updated analysis indicates that flux is minimal based on field studies. Maximum block size for the other fumigation methods will remain 40 acres because the buffer zones are several hundred feet to several thousand feet for non-TIF and upturned 40-acre applications at maximum application rates. Larger buffer zones are more difficult to ensure compliance, particularly prohibiting non-handlers inside the buffer.

The 2009-2011 pesticide use report data shows a yearly average of 38 non-strawberry fumigations that exceeded 40 acres, approximately 3% of the 1231 total non-strawberry fumigations. This indicates a 40-acre limit will have minimal impact since there are no prohibitions on fumigating large fields in 40-acre blocks over several days.

73. **40 acres in 24-time period too restrictive and not reflective of watermelon and pepper growing practices (fields are larger). Difficult to break up fields and still maintain a productive growing schedule. Adrian Zendejas, Grower, Desert Mist Farms.**

See response to Comment 72 above. The 2009-2011 pesticide use report data shows that 10 pepper fumigations per year and seven watermelon fumigations per year exceeded 40 acres. Only one pepper fumigation and seven watermelon fumigations during all of 2009-2011 exceeded 80 acres, requiring more than two fumigations to complete. This is less than 5% of the 169 pepper and watermelon fumigations during this period.

74. **40 acre daily limit too restrictive, especially if applicable to individual tree hole replants. What is basis for the 40-acre maximum acreage restriction for orchards and all fields in general? Bill and Carol Chandler, Chandler Farms; Brendon Flynn, Pacific Farms & Orchards Inc.**

See response to Comment 72 above. DPR has reanalyzed the buffer zones for tree hole replant fumigations. Most tree hole fumigations larger than 40 acres would require buffer zones greater than 25 feet, so the limit will remain at 40 acres.

75. **Maximum acreage limits pose a problem for growers who use differing methods to apply the fumigation. In some cases, a grower could apply less fumigant in a 50 acre parcel using drip than in a 40 acre parcel applying maximum rates by shank injection. The appropriate maximum acreage relies on a number of different factors which are specific to the crop, such as application method and rate. DPR should use maximum acreage limitations on U.S. EPA labels. Aimee T. Brooks, Director Regulatory Affairs, Western Agricultural Processors Association.**

As the acreage of the fumigation increases, the probability of exceeding the target concentration can become more variable. The buffer zones are calculated assuming all fields are square, and the maximum air concentration is approximately the same no matter the wind direction. For rectangular fields, concentrations will be higher when wind blows along the length of the field, and lower when the wind blows across the width of the field. Air concentrations have a higher probability of exceeding DPR's target concentration when the wind blows along the length of an elongated field larger than 40 acres.

76. **What is the basis for the 40-acre maximum field size limit? 40-acre limit would require large growers to change growing practices, specifically irrigation infrastructure and planting windows (p. 14 - 15, CMTF). Chloropicrin Manufacturers' Task Force.**

See responses to Comments 72, 73, 74, and 75 above.

77. **Forty acre maximum is unrealistic for all crop types. It ignores the fact that different crops require different acreage due to application methods and rates. This is the case with tree hole fumigations. Husein Ajwa, UC Cooperative Extension Specialist; Henry Giclas, Senior Vice President, Western Growers.**

See response to Comment 74 above.

78. **Would like justification of why 40-acres is the maximum application size, specifically for TIF tarped applications. Calculate the maximum acreage allowable for TIF tarps that yields a 25ft buffer. Michael Stanghellini, Director of Research and Regulatory Affairs, TriCal Inc.**

DPR has increased the maximum acreage for TIF applications to 60 acres since flux is minimal.

79. **40-acre daily limit is too restrictive. DPR mitigation should state that the limitation would be calculated based on the actual treated acres. As an example, if a 50% strip (12 feet out of 24 feet) is being treated in 80 acres, it would be equal to 40 acres treated. The potential emission should be the same for this treated 80 acres as it**

would be for 40 acres treated solid. This would be more equitable as it standardizes the maximum application rate across all application types. Paul Giboney, PCA, M. Caratan Inc.

Consistent with label requirements, DPR has calculated buffer zones based on the broadcast-equivalent application rates, which account for treated and untreated areas for bed and strip fumigations.

Buffer Zone Reduction Credits –

80. **DPR notes uncertainty on how to approach the tarps for which U.S. EPA assigned the 40% reduction (VIF). VIF contain nylon as the barrier layer. Generally, most of the VIF data shows a trend for significantly reduced emissions from bed applications. There are little or no flux data available for these types of films for broadcast applications, nor are broadcast films containing nylon really available. DPR should consider approving the 40% credit for these films, especially for bedded shank and drip applications. Chloropicrin Manufacturers' Task Force.**

There is not sufficient field data for 40% reduction VIF tarps to award that credit.

81. **DPR indicates that credits for soil properties are too difficult to enforce. However, growers routinely have very detailed soil analyses conducted as the results are used to determine fertility and micronutrient needs that are resolved by soil amendment. These soil reports include % organic matter and soil texture. The soil temperature requirement can be met via recording of direct-reading temperature probes. DPR could condition the credit on inclusion of the field's soil report in the site-specific Fumigant Management Plan. Chloropicrin Manufacturers' Task Force.**

The soil properties relationship to flux is not established.

82. **Available data support the 15% credit assigned to water seals. DPR's analysis in Appendix 4 of the flux data from a 2007 study in Salinas shows that the applied water seal reduced the chloropicrin peak flux by 35% compared to the field that was covered with polyethylene tarp alone (50.4 versus 77.7 ug/m²/second). Other supporting evidence was not obtained using the traditional field volatility methods but should be considered (e.g. Gao et al., 2009). DPR should approve the 15% credit for drip applications. If one source of emissions is from the field edge where the tarp stops, then a water seal applied to the edges of a broadcast tarp application should also qualify for the water seal credit of 15%. Chloropicrin Manufacturers' Task Force.**

Only one application in the chloropicrin database used a post application "water seal." This was a drip/Poly Tarp application in the Salinas study (Ajwa, 2010; 0199-0136). The maximum flux from this application was 50.4 ug/m²sec. The mean maximum 6-hour flux for the Poly Tarp group is 38.9 ug/m²sec. So, based on the data currently available a post

application water seal cannot be justified as an additional mitigation measure beyond the tarp type.”

The cited study (Gao et al., 2009) is not adequately cited to identify. However, DPR only uses flux estimates from field studies that use either back-calculated or directly measured flux. Thus far, all of the Gao studies reviewed by DPR used flux chambers, which are not acceptable.

83. **DPR’s evaluation of the 2007 Salinas study supports the potassium thiosulfate (KTS) credit, where the application of KTS resulted in a 58% reduction from the water seal only flux rate, and a 73% reduction from the polyethylene tarp only flux rate. Chloropicrin Manufacturers’ Task Force.**

DPR’s analysis shows that applications receiving KTS do not show maximum flux that is different from those that did not receive KTS.

84. **Soil moisture is generally regarded as a key good agricultural practice that reduces chloropicrin emissions. Based on Hydrus modeling, DPR scientists have found that soil moisture and the related factors of bulk density appear to be two of the main soil factors affecting fumigant flux. However, Section C of Appendix 4 states, “The effect of soil moisture on chloropicrin flux was examined in a separate memorandum and found to be unsubstantiated”. DPR should incorporate data regarding the emissions impact of soil moisture in the buffer zone calculations. Chloropicrin Manufacturers’ Task Force.**

The impact of soil moisture on the maximum chloropicrin flux thus far is unsubstantiated. When data supporting soil moisture as a significant factor on the magnitude of maximum flux becomes available it will be incorporated into buffer zone development. For details of DPR analysis of soil moisture and maximum chloropicrin flux see Appendix 3 of: http://www.cdpr.ca.gov/docs/whs/pdf/appendix_4_development_of_chloropicrin_buffer_zones.pdf.

85. **DPR should allow buffer zone reduction credits for soil types and organic material content. Patrick Griffin, Agriculture Commissioner, Siskiyou Co.**

There is not sufficient data to demonstrate a significant effect of soil types and organic content on the maximum chloropicrin flux.

Tree Hole Restrictions –

86. **The acreage restriction and maximum number of trees treated per acre are too restrictive. Due to dispersion of the tree holes, only a small amount of chloropicrin is needed and applied per acre. Restrictions on total acres that may be treated in a 24 hour period and the maximum numbers of holes that may be treated per acre will result in costly and unnecessary delays in replanting trees. At the 80th percentile, the 230 tree maximum limitation would make fumigation crews 1/3 less productive (can**

treat a total of 345 holes in a day). With a record of no bystander incidents associated with orchard establishment fumigations, or with fumigating tree holes for replanting, the restrictions are unwarranted. **Aimme T. Brooks, Director Regulatory Affairs, Western Agricultural Processors Association.**

DPR has developed a table that limits the number of tree holes based on the number of acres fumigated. See Table 14 in the final mitigation document:
http://www.cdpr.ca.gov/docs/whs/pdf/dpr_chloropicrin_mitigation_doc_app_1_3_final.pdf.
 See response to Comment 1 above.

87. **Orchard replants have individual tree holes spread across a number of acres that require treatment; it is not uncommon for several hundred tree sites to need treatment across an 80 acre orchard block. In these cases, a 40 acre limit does not make sense. Husein Ajwa, UC Cooperative Extension Specialist; Michael Stanghellini, Director of Research and Regulatory Affairs, TriCal Inc.**

DPR has reanalyzed the buffer zones for tree hole replant fumigations and developed a table that limits the number of tree holes based on the number of acres fumigated. See Table 14 in the final mitigation document:
http://www.cdpr.ca.gov/docs/whs/pdf/dpr_chloropicrin_mitigation_doc_app_1_3_final.pdf.
 Most tree hole fumigations larger than 40 acres would require buffer zones greater than 25 feet, so the limit will remain at 40 acres.

TIF Tarp Limitations -

88. **TIF tarps expensive to use and dispose of. Even if available as an option for nut growers, TIF tarp would be extremely costly to growers with estimates of \$1250 or more per acre. Hebe Bradley, Norcal Nursery, California Strawberry Nurserymen's Association; Aimme T. Brooks, Director Regulatory Affairs, Western Agricultural Processors Association.**

Nut growers have several options to reduce the cost of the requirements. Strip or GPS-targeted fumigations are effective in some situations, with or without a TIF tarp. These fumigation methods reduce the amount of fumigant applied, the amount of tarp needed, and the buffer zone.

DPR has updated its analysis and calculated buffer zones for untarped applications based only on the single deep injection study available, and included weather data from five stations. However, even with these modifications, the buffer zones for untarped-deep applications will be approximately 75% of those originally proposed by DPR.

89. **Proposes TIF-only applications, under the rationale that DPR adopt the strictest regulations whenever there is difference between label and regulations. Cesar Campos, Coordinator, Central California Environmental Justice Network; Dana Perls (oral comment), Pesticide Watch.**

DPR's requirements will reduce chloropicrin exposures below a level at which adverse effects are very unlikely. An application using a TIF tarp is one measure to achieve this acceptable exposure level, and current labels have buffer zones that will effectively achieve those levels for TIF applications. DPR is proposing much larger buffer zones than the current labels for non-TIF and untarped applications and reducing maximum acreages allowed per application to reduce exposure to acceptable levels. Labels including these restrictions for the non-TIF and untarped application methods would be optimal as these would reduce confusion and facilitate enforcement.

90. **Growers have little experience with leaving TIF tarps on beds for a growing season. TIF tarps add additional costs. TIF tarps cannot be used by all growers. The suitability of TIF tarps on raised beds has not been studied. Chloropicrin Manufacturers' Task Force, Cynthia Cory, California Farm Bureau Federation; Rod Koda, (grower) Shinta Kawahara Co.**

Approximately one-half of the chloropicrin fumigations in the Central Coast region have used TIF tarps since U.S. EPA's label changes of 2012. DPR is not aware of any major issues using TIF.

91. **Is part of a team that has established a trial that is researching the benefits of TIF and the potential use of tarp technology in almond orchards, and has found points within the proposed changes to chloropicrin regulations that do not match trial observations. They are as follows:**
- a. **Tarps are not feasible in an orchard setting: cannot be used with deep injection rigs, need to be removed manually because both edges are buried, encourage erosion, susceptible to being buried during winter rains, additional farmer costs.**
 - b. **Unsure how tarps affect nut crops. There is a project established to research the impact of tarps and C35 on the soil-borne diseases and pests that we wish to control.**

David Doll, UC Cooperative Extension Farm Advisor.

According to pesticide use reports, tarps have been used for some orchard fumigations, and DPR has worked with TriCal to develop more feasible tarp fumigation methods. Erosion should be minimal because TIF tarps remain in place for only nine days. Tarps are used to reduce emissions of chloropicrin and protect bystanders. This should retain a greater amount of fumigant in the soil and likely increase the effectiveness of the fumigant, given the same application rate. The tarps are usually removed several weeks prior to planting, so tarps should have no effect on orchard crops.

92. **DPR must assist tree/vine growers by developing workable conditions for non-tarped deep shank applications. Tarp use is not practical for most orchard and vine growers because of economic constraints. These crops do not become profitable for several years, which make the upfront costs of tarp use impossible to accommodate. DPR should factor in that there have no reported bystander incidents attributed to non-tarp deep shank applications. There should be separate buffer zone tables for deep**

shank applications. Michael Stanghellini, Director of Research and Regulatory Affairs, TriCal Inc.

Tree/vine growers have several options to reduce the cost of the requirements. Strip or GPS-targeted fumigations are effective in some situations, with or without a TIF tarp. These fumigation methods reduce the amount of fumigant applied, the amount of tarp needed, and the buffer zone.

DPR has updated its analysis and calculated buffer zones for untarped applications based only on the single deep injection study available, and included weather data from five stations. However, even with these modifications, the buffer zones for untarped-deep applications will be approximately 75% of those originally proposed by DPR.

93. **Tarps should be regularly inspected. What agency (DPR? CAC?) would be responsible for the inspections? Yolie Rios (oral comment), CRLA.**

Fumigant product labeling under Fumigation Management Plan (FMP) requires that a certified applicator must prepare a “Tarp Plan” that indicates a schedule for inspecting tarps during the application for damage and tears; minimum size of damage that will be repaired; and factors used to determine when tarp repair will be conducted.

Field fumigation use monitoring inspections are conducted by the County Agricultural Commissioner. Inspections also include pesticide pre-application site inspections when the notice of intent (NOI) is filed. Guidance for conducting field fumigation use monitoring inspections is found in DPR’s [Pesticide Use Enforcement Standards Compendium, Volume 3, Chapter 6](#).

Tarp Cutting Interval –

94. **9 day tarp cutting interval is too long and would impact planting schedule for watermelon and peppers. Adrian Zendejas, Grower, Desert Mist Farms.**

See response to Comment 95 below.

95. **Revise TIF tarp cutting interval of 9 days? Create a tarp cutting table with different intervals for different application rates and acreage? Create an optional TIF buffer distance table, with distances based on higher flux associated with 5-day tarp cutting? Insufficient data to accurately determine TIF tarp cutting interval for methyl bromide and 1,3-D. Proposed 5-day cutting interval for applications at less than maximum label rate. Chloropicrin Manufacturers’ Task Force; Cynthia Cory, California Farm Bureau Federation; Henry Giclas, Senior Vice President, Western Growers; Robert Roy, President and General Counsel, Ventura County Agricultural Association; Tiffany Martinez, Shasta County Farm Bureau; Bernard Olsen, President, San Luis Obispo County Farm Bureau; Karri Hammerstrom, President, California Women for Agriculture; Renee Pinel, President/CEO, Western Plant Health Association; Richard Schmid, President, Riverside County Farm Bureau ;**

Ryan Jacobsen, CEO, Fresno County Farm Bureau; Sam Mudd, President, Tehama County Farm Bureau; Gary Obebauf, Agricultural Research Consulting; Gary Obebauf, Agricultural Research Consulting; Vito Chiesa, District 2 Supervisor, Stanislaus County.

[Response to Questions 94 and 95.]

DPR's recommended permit conditions have included a 9-day tarp cutting interval for TIF tarps since 2013. Discussions with county agricultural commissioner staffs indicate no problems complying with this requirement. Creating a tarp cutting table would add unneeded complexity to the requirements.

96. **Increased tarp cutting interval increases likelihood of tarp failure, specifically concerned with tarped applications in windy areas. Patrick Griffin, Agriculture Commissioner, Siskiyou Co.**

For specific locations with a high probability of tarp failure, DPR can work with county agricultural commissioners to develop additional measures to compensate for the possible loss of a tarp for specific situations.

97. **The nine day tarp period will cause major disruptions for straight chloropicrin during late season applications or other scenarios that compress the time available between fumigating and planting. Some causes of time compression are delays in land rental agreements, delayed harvest on the field's previous crop, and weather events such as early or late season rains. Growers facing these delays may no longer have access to or the ability to apply methyl bromide or 1,3-D formulations. A minimum nine day tarp duration can be detrimental, as these broadcast tarped fields still need to be aerated, reworked, bedded up, plumbed for irrigation and bed-tarped, and then planted. A nine day tarp period coupled with a 24-hour aeration period before tarp removal may leave an inadequate amount of time for the grower to prepare the field for planting before the optimal planting window passes. Most crops need to be planted at precise times in order for those crops to meet their expected yield potential. Chloropicrin Manufacturers' Task Force; Michael Stanghellini, Director of Research and Regulatory Affairs, TriCal Inc.**

See responses Comments 94 and 95 above.

98. **Nine day tarping requirement for all TIF applications is not supported by the data. It is based predominantly on the 2011 Lost Hills, CA study, conducted using maximum application rate for the broadcast tarped method (350 lbs chloropicrin/acre). An assessment of the tarp period needed for application rates that are in the low (up to 200 lbs chloropicrin/acre) to medium (201 – 275 lbs chloropicrin/acre) range is needed. Data from the 2009 Wasco, CA study and a 2009 field volatility study conducted in Ventura could be used for these assessments. Chloropicrin Manufacturers' Task Force; Michael Stanghellini, Director of Research and**

Regulatory Affairs, TriCal Inc.; Renee Pinel, President/CEO, Western Plant Health Association.

All data was considered in establishing the tarp cutting interval and shows that a 10-day tarp cutting interval may not be necessary. However, the difference between the 5-day tarp cutting flux (42.0 ug/m²sec) versus the average of the two 6-day tarp cutting flux (6.2 ug/m²sec) is substantial. DPR selected a 9-day tarp cutting interval to compensate for variability in the data.

99. **DPR should require that tarp cutting is at least 9-days after application. Sam Sleezer, Healthy Tehama Bend Farms.**

DPR will require a TIF tarp cutting interval of at least 9 days.

Emergency Preparedness and Response Measures –

100. **Supports the proposed monitoring option as a method to provide greater community protection. Aimme T. Brooks, Director Regulatory Affairs, Western Agricultural Processors Association.**

DPR appreciates your feedback on our mitigation measures.

101. **The proposal gives an incentive for growers to use notification over direct monitoring. Monitoring sensory concerns is an invalid method. Chemical testing on people represents an exposure event. DPR is requiring someone to expose themselves; people have different detection thresholds. Sensory monitoring is unethical, not “generalizable” to the nearby population, and is a perceived conflict of interest between the monitor and employer. DPR should require “real-time air monitoring technology” in place of sensory monitoring. DPR or CAC should be the monitor and not someone employed by the applicator. DPR should require 2 night time observations. DPR should provide more information about emissions after tarp cutting (9-day) and whether handlers and the community will be protected. Cesar Campos, Coordinator, Central California Environmental Justice Network. Dana Perls (oral comment), Pesticide Watch; Anne Katten, CRLA; Paul Towers, PANNA; Sarah Aird, Californians for Pesticide Reform, Kenia Acevedo, CRLA; Mitzi Shpak, Executive Director, Action Now, et al. (102 additional signatures); Luis Medellin (oral comment) El Quito Sol de America; Sam Sleezer, Healthy Tehama Bend Farms; Isabel Arrollo (oral comment), El Quito Sol de America.**

“Real-time air monitoring technology” for chloropicrin can be less sensitive than sensory irritation. These tubes are developed for use in industrial settings, where a constant source of gas may be present in the air (i.e. continuous emission). Chloropicrin detection tubes, such as Kitagawa or GasTec, can detect concentrations as low as 50 parts per billion. However, in order for the tubes to detect at this level, two pump strokes are required, with each stroke requiring 1.5 minutes to complete. The tubes are not optimal for monitoring transient, episodic emissions. Unless chloropicrin is offgassing constantly from the treated

field, as in the case of a post-application offgassing event, the tubes may not give an accurate reading of the airborne chloropicrin concentrations. The certified applicator has the option of notifying nearby residences and businesses of the upcoming fumigation if they do not want their employees to conduct sensory irritation monitoring.

102. **CMTF supports the proposal to provide notification in both English and in Spanish. MTF notes that DPR’s proposal to require additional monitoring will take extra time and expense, and does not believe it is necessary. However, they do not oppose the measure. Chloropicrin Manufacturers’ Task Force.**

See response to Comment 103 below.

103. **Supports the choice either notification or monitoring. Cynthia Cory, California Farm Bureau Federation; Henry Giclas, Senior Vice President, Western Growers.**

[Response to Questions 102 and 103.]

DPR appreciates your feedback on our measures.

104. **DPR should require “mandatory and comprehensive” notification (“door-to-door”) of families living within ½ mile of the application site, and should include contact information on who to call about the applications. Notification should occur 2 weeks and 24 hours prior to application. Sam Sleezer Healthy Tehama Bend Farms; Mitzi Shpak, Executive Director, Action Now, et al. (102 additional signatures); Luis Medellin (oral comment) El Quito Sol de America.**

The label requirement for notification or monitoring is intended to address an emergency situation. DPR believes that there could be situations where sensory irritation monitoring is a better alternative than notification to identify an emergency. Therefore, DPR has left both options in the final mitigation document. DPR decided to maintain the label-required distances for emergency preparedness and response notification. The labels also require that, when notification is given, contact information for the certified applicator and the property owner is included. Although DPR has decided to keep the label-requirement for a 3 week window for notification, the CAC can provide application-specific notification for persons requesting specific information on date and time of fumigation.

105. **Chloropicrin has a warning agent property that makes one aware of its presence at very low levels. Because of these characteristics, post-application monitoring is protective of both the workers who conduct the monitoring and the neighboring community. If there is detection, emergency response measures in the site-specific FMP would be enacted, an extra layer of protection. Renee Pinel, President/CEO, Western Plant Health Association.**

DPR agrees that chloropicrin is detectable at very low levels. It is an oily liquid with a strong, sharp, highly irritating odor, and is a strong lachrymator (causes tearing). According to the American Conference of Governmental Industrial Hygienists, airborne

exposure to 0.3-0.37 ppm for 3-30 seconds results in eye irritation. This response is reported to be highly variable among individuals and tearing may occur at airborne exposures of 0.15-0.3 ppm. For these reasons, chloropicrin is added to odorless fumigants to serve as a warning agent. However, the characteristics that make chloropicrin such an effective warning agent have caused problems when the material moves offsite from treated fields. DPR's mitigation focuses on minimizing the potential for chloropicrin to move offsite, keeping bystanders a sufficient distance from treated fields in the event that offsite movement does occur, and ensuring that response measures are adequate to deal with an offsite movement.

106. **As a fieldworker exposed during post application work, doctors did not consider symptoms as due to fumigant exposure. Notification needs to be done in Spanish. Pedro Paez (oral comment), Community member.**

DPR has included the requirement that notification be done in both English and Spanish.

107. **How will the community be notified of tarp failures? Cajé Segura (oral comment), Community member; Michael Marsh (oral comment).**

See response to Comment 108 below.

108. **Neighbors need to know the response plan to emergencies. Neighbors need to be able to get information about the applications after business hours, clear points of contact. Irma Medellin (oral comment), El Quito Sol de America.**

[Response to Questions 107 and 108.]

DPR believes that notifying the community of a tarp failure may not be the most effective approach to preventing bystander exposure. Instructions on how to handle tarp failures of various sizes are included in the Emergency Response Plan, which is part of the Fumigant Management Plan that is required for each application block. DPR feels that implementing the Emergency Response Plan is the most appropriate way to manage chloropicrin offsite movement due to tarp failure. Because the most appropriate way to deal with emergencies is to notify first responders, there is no benefit to neighbors knowing the details of a site-specific Emergency Response Plan.

109. **No applications should be allowed within at least 1/4 mile of schools. DPR should require comprehensive notification (door-to-door 1/4 mile) to all residents within 1/4 mile of the application site, and that it be given at least 48 hours before application. DPR should also require that first responders and school nurses be informed as well. Beverly Bean (oral comment), Community member; Michael Marsh (oral comment), CRLA; Paula Placencia (oral comments), Lideres Campesinas; Demetrio Prunera (oral comment), Community member; Mary Solorio Jacka (oral comment), CRLA; Nancy Edith Gonzalez V. (oral comment), Lideres Campesinas; Angel Sanchez, Community member; Hazel Putney (oral comment), PUEBLO/CAUSE.**

DPR is addressing additional protective measures for schools for all pesticide applications in a separate mitigation effort. After extensive discussion and review, DPR has decided that the label-required Emergency Preparedness and Response triggers are adequately protective. CACs have the option to require more stringent measures for situations that they feel local conditions warrant additional measures to assure protection. Additionally, CACs can provide application-specific notification if persons request specific information on date and time of fumigation. During previous discussions with first responders, they requested that they not be given notification of every scheduled fumigation, as they would not be able to process all of the information. Notification of school nurses can be addressed in the separate schools mitigation effort mentioned at the beginning of this response.

110. **Notification a week out is too long, as application circumstances could change over that time period. A 24-72 hour notification schedule would work better for growers and the community. New NOIs would have to be submitted if date is changed. Steve Pastor (oral comment) Riverside County Farm Bureau.**

Although DPR has decided to keep the label-requirement for a 3 week window for notification, the CAC can provide application-specific notification for persons requesting specific information on date and time of fumigation.