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Maziar Kandelous
California Department of Pesticide Regulation
1001 I Street, P.O. Box 4015
Sacramento, CA 95812-4015

by email: Maziar.Kandelous@cdpr.ca.gov

RE: Comments on Draft Air Monitoring Report for 2019

Dear Dr. Kandelous:

Thank you for the opportunity to comment on this draft report. We appreciate all the hard work that went into conducting the air monitoring, compiling the report, and providing a detailed presentation of air monitoring results. We offer the following recommendations to improve data presentation and transparency of risk estimates.

We continue to find the air monitoring database very useful. We hope the department is continuing to look for a replacement for google fusion tables so that more search features can be reinstated. However, we are concerned that the presentation of air monitoring results in the annual report continues to be misleading, incomplete and, in some instances, inaccurate in its description of health threats from airborne pesticides. We once again strongly urge the Department to

revise the draft report to provide a more comprehensive description of the air monitoring data.

Comments on data presentation in the draft report

Executive Summary
The conclusion in the Executive Summary that none of the pesticides or breakdown products monitored exceeded screening levels should be supplemented with these clarifying statements:
1) The 8 year average 1,3-D air concentration of 0.38 ppb at the Shafter site exceeds DPR's previous regulatory target of 0.14 ppb which OEHHA continues to support.
2) The highest chloropicrin 4 week rolling average air level at the Oxnard site was 0.571 ppb. This exceeds DPR's previous 4 week average sub-chronic screening level of 0.35 ppb by 63%.[1]

Combined results for all pesticides and communities
We remain concerned that beginning the report by quoting statistics that aggregate all the data conveys a false sense of security that does not reflect the air levels documented in the actual monitoring data.

The statements in the report that 96.2% of analyses did not return a detectable concentration, that 3.8% of analyses had at least one detectable pesticide concentration and that only 0.95% of analyses had quantifiable detections are highly misleading because they ignore the realities of pesticide use patterns. In order to reach 100% detections (a total of 14,616 positive analyses), every pesticide tested for would have to be found on each of the days monitored at each of the air monitoring sites. In reality, use of most pesticides is concentrated in certain months. As pesticide use varies between crops and regions, not all of the pesticides monitored are used near all of the monitoring sites. Therefore, using the total number of analyses for all pesticides at all locations as the denominator does not provide a meaningful context.

Detection frequency should either be calculated based on what pesticides were used in the vicinity of a specific site, shortly prior to the sampling date, or should not be highlighted. When these concerns were raised three years ago at the August 18, 2017 PREC meeting, then Branch Chief Pam Wofford stated that DPR was conducting an uncertainty analysis of frequency of detections. Is this analysis still in process and if so when will it be completed?

We note that Table 4 shows that there was an average of at least one pesticide detection in 73% of weekly sample sets collected at each monitoring site. This

[1] In 2017 DPR discontinued the practice of using a 4-week rolling average concentration to compare to chloropicrin and 1,3 D sub-chronic screening levels. This change was made after peak 4 week rolling averages were found to exceed the chloropicrin screening level at the Santa Maria air monitoring site in 2014 and 2015.

statistic should also be included in any discussion of aggregate findings in the report narrative.

The report states that there were 45 lost samples in 2019 including 3 summa canisters. This is a 10 fold increase over 2018 when only 4 samples were lost. The date and location of lost or otherwise invalidated samples should be provided in the report.

The tables in the Air Monitoring Study Results and 1,3-D Ambient Air Monitoring Results Presentations at the July 17th Pesticide Registration and Evaluation Committee[2] (slides 13-15 and slide 26) that compile highest air concentrations and compare highest 1 day, 4 week, 13 week and annual average concentrations between sites for all pesticides with quantifiable detections are very helpful and informative. We once again strongly recommend including them in the report with 1,3-D results combined with other pesticide results. However, in Table 8 and slide 26, annual 1,3 D air concentrations for Oxnard should be included for 2012-2018[3] when this was a TAC monitoring site. We note that these years of data are included for Watsonville which was also a TAC monitoring site in earlier years. Please note also that there is an error in the slide 15 table of highest annual air concentrations for the Shafter chloropicrin value. From comparison with the draft report, the correct value appears to be 0.02 ppb, not 0.2 ppb.

Acute Screening Levels
Chloropicrin
The acute regulatory target for chloropicrin of 73 ppb used in this report as a 24 hour average exposure target level was set in a Risk Management Directive (RMD)[4] as an 8 hour average so at the very least it should be adjusted to 24.3 ppb as a 24 hour level. Furthermore, this 73 ppb target level was set over the objection of OEHHA.[5] The chloropicrin TAC report[6] and risk assessment[7], which are also supported by OEHHA[8], include a 24 hour reference level of 0.92 ppb for protection of children. The highest 24 hour level measured in Oxnard (1.032 ppb) exceeded this reference level by 12% and the highest levels measured in Watsonville (0.854 ppb) Santa Maria (0.455 ppb) reached 93% and 50% of this level respectively.

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[2] DPR Pesticide Registration and Evaluation Committee Air Monitoring Results and 1,3-D Ambient Air Monitoring Results Presentation. July 19, 2019

[3] For 2011 we do not recommend including an annual 1,3 D average concentration for Oxnard or Watsonville because monitoring was not started until October of 2011.

[4] https://www.cdpr.ca.gov/docs/emon/pubs/chloropicrin/directive.pdf

[5] https://oehha.ca.gov/media/downloads/pesticides/report/chloropicrinmitigationmemooehha2013.pdf

[6] DPR Toxic Air contaminant Assessment for Chloropicrin. February 2010

[7] DPR Risk Characterization Document (For chloropicrin exposure of Workers and the General Public) November 2012

[8] https://www.cdpr.ca.gov/docs/risk/rcd/oehha_comments.pdf

MITC

The acute regulatory target for MITC of 220 ppb used in this report as a 24 hour average exposure target level was set in a Risk Management Directive[9] as an 8 hour exposure level so at the very least it should be adjusted to 73 ppb as a 24 hour exposure target level. Furthermore, this level was set over OEHHA's objections [10] because 220 ppb was the "no effects" level in a toxicology study, leaving no margin of error. The DPR TAC report[11] and risk assessment[12] established an 8 hour reference level of 22 ppb for protection against irritation to the eyes and respiratory system which should be adjusted to 7.3 ppb as a 24 hour target exposure level.

The highest 24 hour air level measured in San Joaquin (1.532 ppb) reached 21% of 7.3ppb, the 8 hour reference level of 22 ppb, adjusted for 24 hour exposure. As you know, in the seasonal monitoring study conducted in Arvin in the summer of 2017 a peak 24 hour level of 4 ppb was measured with a month-long average air level of 1.03 ppb, exceeding the sub-chronic screening level of 1 ppb, set to prevent damage to the nasal cavity.

Sub-Chronic Screening Levels

Chloropicrin and 1,3-D

In 2017 DPR discontinued the practice of using a 4-week rolling average concentration to compare to chloropicrin and 1,3-D sub-chronic screening levels and began comparing to 90 day or 13 week rolling averages.[13] This change was made after peak 4 week rolling averages were found to exceed the 4 week chloropicrin screening level at the Santa Maria air monitoring site in 2014 and 2015[14] and the peak 4-week 1,3-D air concentration for 2016 in Shafter reached 97.6% the 1,3-D sub-chronic screening level.[15] DPR toxicologists claim these changes were justified because the toxicology studies used to set the sub-chronic screening levels were 90 days long for chloropicrin and 13 weeks long for 1,3-D. However, the revised averaging times have still not been reviewed by OEHHA and should be.

We think it is more scientifically valid and health protective to continue to compare air levels of these fumigants to the peak 4-week rolling average concentration rather than a season-long average concentration. While rhinitis was found in rats at the

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[9] https://www.cdpr.ca.gov/docs/emon/pubs/mitc/dirctv120202.pdf

[10] OEHHA Memorandum to Charles Andrews of CDPR. Comments on DPR's Proposed Mitigation Strategy for MITC. May 5, 2006.

[11]DPR Toxic Air Contaminant Report for MITC. August 2002

[12]DPR Risk Characterization for MITC. July 2003

DPR Risk Characterization for Metam Sodium. July 21, 2004

https://www.cdpr.ca.gov/docs/risk/rcd/metam.pdf

[13] DPR Memorandum to Shelley DuTeaux. Calculation of Intermediate Term Residential Exposures Using Measured Air Concentrations from the Ambient Air Monitoring Network. August 9, 2016

https://www.cdpr.ca.gov/docs/hha/memos/intermediate_term_exposure_calculations.pdf

[14] DPR Report on Methyl bromide, 1,3-D and Chloropicrin Air Monitoring Results for 2010-2015. November 3, 2016

[15] DPR Air Monitoring Network Results for 2016. Volume 6. December 2017

end of a 90-day chloropicrin inhalation study it may have developed earlier and humans may be more sensitive than rats. In addition, in reality people are exposed to varying levels of chloropicrin and 1,3-D over time and higher level short term exposures may cause more respiratory and nasal problems.

If calculated as a 4 week rolling average, the highest sub-chronic chloropicrin air concentration in 2019 was 0.571 ppb at the Oxnard site. This exceeds the sub-chronic screening level of 0.35 ppb by 63%. If calculated as a 4 week rolling average, the highest sub-chronic 1,3-D air concentration in 2019 was 0.93 ppb at the Shafter site. This reached 31% of the subchronic screening level.

Lifetime exposure: Cancer risk estimates

The phrase "potential carcinogens" is not appropriate. The pesticides 1,3-D, chlorothalonil, DDVP, diuron, iprodione and propargite are classified as known carcinogens under Proposition 65 and as probable carcinogens by USEPA. In addition, studies are in process evaluating potential carcinogenicity of MITC and chloropicrin.

DPR has selected a cancer risk level of 1 in 100,000 as the regulatory target for 1,3-D but this level is <u>not</u> generally considered negligible. A cancer risk of 1 in 1 million is used as the level of negligible risk by DPR in risk assessments and considered by OEHHA and most public health entities as the limit for adequate health protection.

The report should also note that DPR's 1,3-D risk assessment includes both the portal of entry and systemic cancer potency risk factors and that OEHHA maintains that the systemic cancer potency risk factor should continue to be used for adequate health protection. We note, as shown in slide 29 of the Air Monitoring Network results July 17, 2019 PREC meeting presentation, that when utilizing the systemic cancer potency risk factor, risk exceeds 10^{-5} at the Shafter site and also the Parlier and Delhi sites where weekly 1,3-D monitoring is being conducted in a separate study. Further, at the Santa Maria site, the average air concentration reached 0.13 ppb, exceeding the 0.1 ppb threshold level OEHHA supports to protect children from cancer.

We also note that 1,3-D cancer risk levels exceed 10^{-6} at the Shafter, Santa Maria and Watsonville sites using the portal of entry cancer potency factor.

Both slide 29 of the AMN PREC presentation and Table 8 of the draft report are misleading for the Oxnard site where 1,3-D was also monitored from October 2011 through December 2018 by CARB. Much higher air levels recorded in earlier years elevate the overall average concentration and thus the cancer risk level substantially.

Chloropicrin carcinogenicity

The average annual concentration of chloropicrin in Oxnard was 0.06 ppb (60 ppt), in Watsonville 0.05 ppb (50 ppt), in Santa Maria was 0.03 ppb (30 ppt) and in

Chualar and Shafter 0.02 ppb (20ppt). If sustained over time, these concentrations all greatly exceed the reference concentration of 0.24 ppt for controlling cancer risk to the 1 in a million level that was established in the DPR Chloropicrin TAC and Risk Characterization documents as the negligible risk level and supported in review by OEHHA and the TAC Scientific Review Panel. DPR subsequently made a unilateral decision that chloropicrin cancer data was equivocal and that an additional study was needed to assess cancer risk. That study is not due to be submitted until December 31, 2021[16] so in the meantime we are left with great uncertainty about cancer risk from chloropicrin exposure due to this huge data gap.

Cumulative Exposures

The results described in Table 10 clearly illustrate that exposures occur to multiple organophosphates at monitoring sites in California. However, the comparison to screening levels based on cholinesterase inhibition likely underestimates the risk associated with these exposures. Both DPR and OEHHA have concluded that the most sensitive health endpoint for chlorpyrifos is developmental neurotoxicity and these harms have been documented in animals and human studies at levels below that which results in cholinesterase inhibition. In 2015, USEPA concluded that there was substantial evidence linking exposure to the class of organophosphates to developmental neurotoxicity and that this harm could occur at levels below that which caused cholinesterase inhibition. To more accurately describe the health risk associated with the cumulative exposure to the organophosphate levels detected at monitoring sites, DPR should work with OEHHA to develop a screening level that protects against neurodevelopmental harm and, in the meantime, include an explanation in any reports that the cumulative exposure analysis does not fully capture the risks associated with these exposures.

In addition, DPR's focus on evaluating cumulative exposures only for those pesticides with a known common mode of action is too narrow and doesn't capture the risks associated with the combined exposures to multiple chemicals with the same health effect. This broader approach is needed to more accurately describe the risks posed by pesticides detected at air monitoring sites in California.

Results for individual communities

We appreciate inclusion of a description of each community. An aerial view map of each monitoring site would be helpful along with an assessment of proximity to agricultural fields.

The figures showing temporal trends in levels of individual pesticides detected at each monitoring site are very useful.

Field spike recoveries

Lab spike recoveries for MITC (81%) and DDVP (82%) seem a little low and suggest that reported values for these pesticides may be underestimates. We also strongly

[16] Ann Prichard, communication by email

disagree with the Department's decision to discontinue use of field spikes at the end of 2018. It seemed appropriate to devote more resources to figuring out why multiple field spikes were low (less than 80% for chlorothalonil, chlorpyrifos, malathion and MITC) instead of discontinuing field spike measurements.

Field spikes provide reliable data about how field conditions may be affecting sample recovery. While the field spikes have their challenges and the data from them have their limitations (as cited by DPR in the 2018 AMN update)[17], discontinuing the practice of collecting field spikes would mean that *no* information would be collected about how field samples might have been affected by important environmental conditions (e.g., humidity, temperature, other environmental factors affecting samples). For example, a 2018 memo[18] from CDFA regarding MITC stated "The low recovery for the blind spikes would indicate that the sampling, extraction and analysis of the samples the lab analyzed during 2017 are reporting findings that are lower than what is actually in the air during the sampling."

MITC air monitoring studies conducted by academics[19] have included fortified field spikes, in order to collect data about field conditions while conducting air sampling. DPR could potentially use information from field spikes to help determine whether losses in the field are the result of laboratory methods (as CARB determined for 2017 methyl bromide samples), or for other reasons. In the 1990s, low field spike recovery rates for methyl bromide contributed to a study being conducted that showed that recoveries were greatly improved if steel canisters were used, rather than charcoal air tubes. As a result, sampling methodologies were improved for DPR field sampling. Therefore, field spikes can be useful and indeed may play an important role in helping DPR assess whether screening thresholds are potentially being exceeded.

Historical air concentration analyses

It would be better to place the historical air concentration analyses, which provide very useful background, in the "Results from individual communities" section after

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[17] DPR Air Program Updates and Quality Control Discussion (Edgar Vidrio).
Memo from CDFA to DPR. Field Spikes for Air Monitoring Studies. November 2, 2018.

[18] CDFA memo to DPR: Addressing the recovery of MITC from charcoal tubes, June 14, 2018.
https://www.cdpr.ca.gov/docs/emon/airinit/cdfa_memoranda_mitc_field_spike.pdf#page=4

[19] Woodrow, James E., et al. "Determination of Methyl Isocyanate in Outdoor Residential Air near Metam-Sodium Soil Fumigations." *Journal of Agricultural and Food Chemistry* 62, no. 36 (September 10, 2014): 8921–27. https://doi.org/10.1021/jf501696a.

Littke, Matt H, et al. "Comparison of Field Methyl Isothiocyanate Flux Following Pacific Northwest Surface-Applied and Ground-Incorporated Fumigation Practices: Comparison of Field Methyl Isothiocyanate Flux Following Different Fumigation Practices." *Pest Management Science* 69, no. 5 (May 2013): 620–26. https://doi.org/10.1002/ps.3414.

2018 data for each community site. In the historic analyses, we appreciate that non-zereo values are provided in both ppb and ng/m3 this year.

The historical air concentration analysis shows that the Shafter had the first ever detection of chloropicrin in 2019. This should be mentioned earlier in the report.

For Oxnard, Santa Maria and Watsonville more than 2 years of data are available for 1,3-D, methyl bromide and chloropicrin because these were previously TAC sites. That additional data should be included in historical analyses.

Air Monitoring Database

The Air Monitoring database previously available in google sheets was very well designed, user friendly and versatile. We greatly appreciated the inclusion of preliminary monitoring data and the ability to filter data by chemical, site and specific time periods and download filtered data into spreadsheets. It is unfortunate that Google discontinued Google fusion tabless at the end of 2019. We urge DPR to develop an alternative database that continues to be searchable and if possible is expanded to include mapping and graphing functions but we appreciate that preliminary monitoring data is still being posted for download into a spreadsheet.

Suggestions for further analyses

Many of these monitoring sites are located at schools. We would recommend conducting an analysis to evaluate how the school buffer zone requirements may have impacted air levels measured at these sites. It also appears that 1,3- D and chloropicrin air levels have decreased at coastal sites in recent years. We recommend conducting an analysis that looks at whether there is any correlation between these fumigant air levels and the extent of use of TIF tarps surrounding the air monitoring sites.

Please contact us if you have any questions about these comments. Thank you again for your hard work maintaining the Air Monitoring Network and database and preparing these reports.

Sincerely,

Anne Katten, MPH
California Rural Legal Assistance Foundation
akatten@crlaf.org

Miriam Rotkin-Ellman, MPH
Natural Resources Defense Council
mrotkinellman@nrdc.org

Emily Marquez, PhD
Pesticide Action Network
Emily@panna.org

Caroline Cox, MS
Center for Environmental Health
caroline@ceh.org

Jane Sellen and Sarah Aird,
Californians for Pesticide Reform
Jane@pesticidereform.org
Sarah@pesticidereform.org