California Environmental Protection Agency
Department of Pesticide Regulation

Review by the Toxic Air Contaminant Workgroup of Documents Related to the Draft 1,3-Dichloropropene Regulations

November 7, 2022

The Department of Pesticide Regulation (DPR) drafted new regulations and amendments to existing regulations that restrict the use of 1,3-dichloropropene (1,3-D) to mitigate the potential 72-hour acute risk and 70-year lifetime cancer risk to non-occupational bystanders. The draft action:

- Allows the use of 1,3-D only for the production of agricultural commodities, effectively prohibiting other uses that are not currently registered;
- establishes mandatory setbacks (distances from occupied structures where 1,3-D cannot be applied);
- sets limits on the application rate and acres treated for individual field soil fumigations;
- places restrictions on multiple field soil fumigations that do not meet distance or time separation criteria;
- limits the allowed methods to apply 1,3-D, including establishing criteria for acceptable types of tarpaulins that can be used;
- requires an annual report that includes evaluation of 1,3-D use and air monitoring; and
- requires the inclusion of certain information in existing pesticide use records and pesticide use reports.

1,3-D is listed as a toxic air contaminant (TAC) in Title 3, California Code of Regulations (3 CCR) section 6860(b) based on its designation as a hazardous air pollutant under the federal Clean Air Act. As a TAC and hazardous air pollutant, DPR determined the “need for and appropriate degree of control measures" pursuant to Food and Agricultural Code (FAC) section 14023(f). Control or mitigation measures that DPR develops for TACs must follow the requirements specified by FAC section 14024, including consulting with specified agencies. DPR formed a TAC workgroup to comply with the consultation required by FAC section 14024. In addition to the County Agricultural Commissioners (CACs) and the Air Pollution Control Districts (APCDs) required by FAC section 14024, the workgroup included representatives from California Air Resources Board (CARB) and the Office of Environmental Health Hazard Assessment (OEHHA). The TAC workgroup also included a representative of the California Department of Food and Agriculture (CDFA) to fulfill the consultation specified in FAC section 11454 and the January 15, 2019, Memorandum of Understanding developed pursuant to FAC section 11454.2. The primary members of the workgroup include:

- CACs: Glenn Fankhauser (Kern County) and Juan Hidalgo (Santa Cruz County)
- APCDs: Richard Stedman (Monterey Bay Air Resources District)
- CARB: Lynn Baker
- OEHHA: Ouahiba Laribi
- CDFA: Nilan Watmore

After discussions with DPR, the TAC workgroup reviewed and provided comments on the following draft documents:

- Text of Proposed Regulations, draft dated September 9, 2022
- "1,3-Dichloropropene Field Fumigation Requirements," a document included in the text by reference, draft dated September 9, 2022
- Initial Statement of Reasons and Public Report, draft dated September 9, 2022
- Documents Relied Upon
    - "Analysis of the sufficiency of the acute measures to mitigate cancer risk to non-occupational bystanders from 1,3-Dichloropropene," draft memo dated September 9, 2022.
    - "Updates to HYDRUS-simulated flux estimates of 1,3-Dichloropropene maximum period-averaged flux and emission ratios," draft report dated June 10, 2022.
    - "Modeling for mitigation measures to reduce acute exposure from 1,3-Dichloropropene, modeling approach #2," draft report dated June 16, 2022.
    - "Modeling for application factors of 1,3-Dichloropropene, modeling approach #2," draft report dated June 16, 2022.
    - "Modeling for the township cap of 1,3-Dichloropropene applications, modeling approach #2," draft report dated June 16, 2022.

The TAC workgroup reviewed, but had no comments on the following draft documents:

- "List of Approved Totally Impermeable Film (TIF) Tarpaulins," draft dated May 19, 2022, required by the draft regulations
- "Analysis of high barrier tarpaulin, cis-1,3-Dichloropropene mass transfer data measured under high relative humidity conditions," draft memo dated May 1, 2022, included in the documents relied upon.

The TAC workgroup comments on these documents and DPR's responses follow.

California Department of Food and Agriculture Comments:

Comment #1: While CDFA's Office of Pesticide Consultation and Analysis (OPCA) has completed an economic analysis showing that the draft regulations will increase the cost of pest management by $1.02 to $1.55 million per year depending on the year and appreciates the opportunity to comment, whether the draft regulations sufficiently reduce emissions to mitigate acute risk and cancer risk to non-occupational bystanders is outside CDFA's jurisdiction. We look forward to continued collaboration with DPR on understanding the economic effects of pesticide regulations.

Response: No response needed.

Santa Cruz Agricultural Commissioner Comments:

Comment #1: **TEXT OF PROPOSED REGULATIONS: 6448.1 Approved Totally Impermeable Film (TIF) Tarpaulins for 1,3-Dichloropropene:** Section 6448.1(c) establishes a process for any interested person to appeal the Director's approval, denial, amendment, or removal of tarpaulins on the "List of Approved TIF tarpaulins." This appeal process seems unnecessary given that tarpaulin manufacturers must meet specific criteria to qualify a tarpaulin as TIF based on the scientific process to be followed and tarpaulins will either meet these specifications or not. The proposed appeal process introduces an arbitrary element in determining which tarpaulins should be included or excluded from the "List of Approved TIF tarpaulins" that is outside of the criteria and should be removed from these regulations.

Response: The process established in Section 6448.1(c) is necessary to allow public input and to ensure due process for tarpaulin manufactures that would potentially be impacted by listing decisions.

Comment #2: Regarding 6448.2, (a) "An application of 1,3-Dichloropropene may use either a totally impermeable film (TIF) tarpaulin or non-TIF (higher permeability) tarpaulin if it meets the following requirements:" I imagine these higher permeability tarps are those that give 20% or 40% buffer credits? Will DPR have a list of these approved tarps also? Should non-TIF be an option?

Response: DPR proposes a single, more stringent TIF standard than labels. This is consistent with the California requirements for other fumigants that do not allow the buffer zone credits specified by labels. The use of non-TIF is an option and included in the proposed regulations, but with significant restrictions relative to acreage, application rate, and setback distance.

Comment #3: **INITIAL STATEMENT OF REASONS: ALTERNATIVES TO THE PROPOSED REGULATORY ACTION PURSUANT TO GOVERNMENT CODE SECTION 11346.2(b)(4). Page 18:** The last part in this paragraph states "…Additionally, the proposed regulation includes three options to meet the soil moisture requirement of 50 percent of field capacity. Other options can be added as long as the moisture level can be verified by inspectors." This last sentence should be removed or modified until the California Agricultural

Commissioners (CAC) can have more discussion with the California Department of Pesticide Regulation to discuss soil verification options from a regulatory and compliance standpoint. The use of the word "inspector" should be changed to "CACs" for consistency and clarity.

Response: Final sentence was removed.

Comment #4: Regarding Updates to HYDRUS-simulated flux estimates of 1,3-dichloropropene maximum period-averaged flux and emission ratios. Page 5. "Very low permeability films, such as those used for TIF tarps, can entrap fumigant gases beneath the tarp where they may persist at relatively high concentrations; further lengthening the period prior to tarp-cut provides additional time for degradation and attenuated emission of fumigant through the tarp surface, reducing the magnitude of the emissions peak upon tarp cutting.": What is the impact of temperature and UV light under the tarp on the 1,3-D breakdown process? Has this been considered as a factor with modeling to prevent extending the tarp cutting period?

Response: Ultraviolet light is understood to have minimal impact on degradation of 1,3-D in air or water; degradation in air will occur mainly by reaction with free radicals and ozone. Any incident UV radiation would moreover be assumed to be fully blocked by the tarp surface material. UV radiation may have implications for the breakdown of the tarp material itself, and this potential effect is considered in the HYDRUS model by use of permeability data obtained from analysis of weathered TIF samples (i.e., samples collected at the end of the tarping duration).

Temperature does have an important effect on 1,3-D degradation rate, with faster breakdown of 1,3-D occurring at higher soil temperatures, and this temperature dependence is considered by the HYDRUS model for 1,3-D in gas, liquid, and solid phases. Our modeling work in HYDRUS uses measured below-tarp temperatures for all TIF simulations, which yields soil conditions substantially warmer than those in untarped treatments—and therefore this consequence of tarping is already considered in the HYDRUS evaluation of tarping duration.

Comment #5: Regarding Modeling for mitigation measures to reduce acute exposure from 1,3-Dichloropropene, modeling approach #2. Page 4. "Cool weather conditions result in lower air/water partitioning and slower degradation of 1,3-D.": What is considered cool? Temperatures below 60 F?

Response: Cool weather conditions were derived from weather data during January at multiple stations, relative to warm conditions during September. More information has been provided in the cited report (Brown, 2019).

Comment #6: Regarding Modeling for mitigation measures to reduce acute exposure from 1,3-Dichloropropene, modeling approach #2. Page 9. "Predicted setback durations are less than 7 days for all FFMs even under the worst-case condition.": Although it has been determined that a duration of less than 7 days is needed even under a worst case scenario, the duration must remain at 7 days due to label requirements, correct?

Response: That is correct.

Comment #7: Regarding Modeling for mitigation measures to reduce acute exposure from 1,3-Dichloropropene, modeling approach #2. Page 9. "The following modeling efforts will only focus on setback distances.": Does pesticide label language eliminating the need for setbacks and setback duration for fields that have not been treated with 1,3-D in the previous two years have any applicability to allow for lesser restrictions based on DPR's data?

Response: Growers and applicators must comply with the most stringent regulatory requirement which is DPR's proposed setback requirements. While the label states that "buffer zone does not apply to use on soils that will not experience an additional 1,3-D treatment for at least three years", this is less restrictive than the proposed regulations and thus will not apply.

CARB Comments:

Comment #1: 24-hour REL – DPR proposed an acute REL based on a 72-hour exposure period. In 2021, we commented that DPR should work with OEHHA to develop a 24-hour REL that could be compared against results from 24-hour air monitoring. We want to reiterate that comment. We are concerned that your regulation will be considered unenforceable if you are not able to verify based on monitoring results that the acute REL is not being exceeded.

Response: A 24-hour reference exposure level (REL) is not necessary for the regulations to be enforceable. Community air monitoring data is designed to help assess seasonal and chronic exposure, not acute exposure. DPR uses the 24-hour data from community air monitoring to trigger further analysis when necessary, not to determine acute risk. Additionally, DPR has established 55 ppb as a regulatory target concentration to develop setback distances, fumigation method requirements (e.g., minimum injection depth), and other mitigation measures. DPR and county agricultural commissioners (CACs) enforce the setback distances, injection depths, and other requirements, not the 55 ppb target concentration. The 55 ppb target concentration, whether a 24-hour or 72-hour average, is not an enforceable standard. DPR's computer modeling can estimate 24-hour air concentrations for comparison to air monitoring data, and estimate the peak 72-hour air concentration that includes the 24-hour period to evaluate the effectiveness of the mitigation measures. The draft setback and other application requirements are similar to existing requirements for 1,3-D and other fumigants that DPR and CACs currently enforce throughout California.

Comment #2: Evaluation of monitoring results – We understand that DPR is currently operating six air monitoring sites at which one 24-hour sample is collected weekly for analysis of 1,3-D. We recommend that results of the air monitoring be evaluated in context with proximity of the monitoring sites to areas of high 1,3-D use.

Response: DPR agrees. The draft regulations require DPR to evaluate monitoring sites if detected air concentrations exceed specified threshold levels, including an evaluation of use patterns. This will help ensure that the regulations provide adequate mitigation in regions of the highest use.

Comment #3: Soil organic content – The HYDRUS flux document describes several factors that affect emissions of a soil fumigant. One of those factors is the organic content of soil. The report describes the finding regarding the organic content of different soils. We suggest including a brief description of how the organic content of soil is measured.

Response: Thank you for the comment. Language detailing the analytical method for soil organic carbon content has been added to the document.

Comment #4: Seasonal mitigation strategy – Modeling approaches are described following two approaches: Approach #1 includes one emission factor for eleven months of the year and a prohibition on use of 1,3-D in December due to the potential for periods of stagnant air that could lead to higher air concentrations; and Approach #2 that includes separate emission factors for November- February and March-October that account for different dispersion during the two periods of the year, along with an annual township cap of 204,000 adjusted total pounds (ATP). We recommend Approach #2, but with no township cap. We believe Approach #2 better accounts for periods of stagnant air that may occur in other months besides December while giving growers flexibility to use limited amounts of 1,3-D in winter months. Regarding the township cap, we understand that DPR's modeling indicates that the mitigation measures will allow increasing the township cap from 136,000 ATP per year to 204,000 ATP without exceeding the air concentrations of health concern. However, as we stated in our prior comments in June, we do not recommend including a township cap until the mitigation measures and modeling assumptions are shown to be health protective. Imposing more restrictive mitigation measures while increasing a township cap by 50 percent sounds contradictory.

Response: DPR agrees and the draft regulations include two sets of setback distance tables, a more stringent set based on November – February weather conditions and a second less stringent set based on March – October weather conditions. DPR no longer proposes to include a township cap.

OEHHA Comments:

Comment #1: Overall comments – Considering that the models used to estimate air concentration (i.e., HYDRUS and AERMOD) have been shown to underestimate peak air concentrations detected by the Air Monitoring Network, similar uncertainties may exist when predicting long-term 1,3-D exposure. While exposure modeling predictions of lower soil emissions are based on known physical and chemical parameters, the actual emissions and air concentrations may also be influenced by additional uncertainties such as:

- Adoption and compliance with key application requirements (soil moisture & application depth)
- Feasibility and sustainability of attaining a mandatory 50% soil moisture content whenever sustained drought conditions limit water resources.

Response: DPR expects high adoption and compliance with the draft regulations, including the soil moisture requirements. Chloropicrin product labels (including products containing both 1,3-D and chloropicrin) currently require soil moisture of at least 50 percent of field capacity.

Additionally, the setback distance requirements are based on soils data from 21 fields just prior to fumigation. The average soil moisture for these 21 fields was greater than 50 percent. Based on the chloropicrin requirement and the data from 21 fields, it is likely that most 1,3-D field soil fumigations already meet the draft requirement. To achieve 50 percent soil moisture, a likely one-time maximum irrigation of three inches of water is needed. In comparison, most almond orchards require 30 to 50 inches of irrigation annually (https://ucmanagedrought.ucdavis.edu/Agriculture/Crop_Irrigation_Strategies/Almonds/). If drought conditions prevent growers from applying the required amount of water it is likely that the drought would also prevent the crop from being grown.

The draft regulations require that 1,3-D fumigations for tree orchards and grape vineyards use a new 24-inch injection or TIF fumigation method. The new 24-inch injection depth was developed based on the suggestion of growers and applicators, so high compliance is expected.

Comment #2: Overall comments – The regulations should specify a timeline for the annual report to be released and subsequent actions to be taken to guarantee timely enactment of additional health protective measures for residents in the townships of concern.

Response: The purpose of the annual report is to provide transparency of DPR's analysis of air monitoring data, estimated air concentrations and whether any additional mitigation is necessary. While DPR acknowledges that preparing this report could take time, DPR believes the report should be complete and comprehensive as an incomplete report could raise questions and cause confusion. In addition, should DPR determine that additional health protective measures are needed, the timeline to implement is dependent on a variety of factors. As such, DPR is unable to specify a timeline in this regulation. However, DPR will continue to be transparent with its analysis and regulation of 1,3-D by posting its annual report as well as any associated documents on its website and make them available by request.

Comment #3: **Overall comments –** The 72-hour average concentration may not be representative of an acute exposure and should be validated by comparing 72-hour averages with 24-hr data.

Response: Community air monitoring data is designed to help assess seasonal and chronic exposure, not acute exposure. DPR uses the 24-hour data from community air monitoring to trigger further analysis when necessary, not to determine acute risk. DPR's computer modeling can estimate 24-hour air concentrations for comparison to air monitoring data, and estimate the peak 72-hour air concentration that includes the 24-hour period to evaluate the effectiveness of the mitigation measures.

Comment #4: **Text of Proposed Regulations –** To reduce short-term and cumulative 1,3-D exposure, regulation 6448.2(b) requires that farmers and applicators ensure that the soil water content is at a minimum 50% of field capacity before the fumigation. The 2022 draft 1,3-D field fumigation requirements describe three ways to achieve this goal: 1) irrigate 2-3 days before fumigation; 2) qualitative estimates based on the feel and texture of the soil; and 3) direct measurement with a moisture sensor.

As described, these methods differ significantly in cost, labor, time invested, complexity and reporting requirements. For example, the sensor method is a complex, multi-step process that includes reporting multiple sensor readings at 6 locations, yet there is no similar requirement for reporting the irrigation event or qualitative moisture estimates. Also, the regulation does not describe how compliance with this requirement will be enforced. OEHHA is concerned that there is no reporting requirement for the irrigation and qualitative moisture estimates.

Response: The U.S. Environmental Protection Agency (U. S. EPA) has proposed label changes for all 1,3-D products, and they include recording soil moisture as part of a fumigant management plan.

The draft requirements, including soil moisture, are similar to labels or regulations for 1,3-D and other fumigants. The current methods of enforcement can be used for the draft 1,3-D regulations, including evaluations of all permits and notices of intent, pre-application site evaluations, use monitoring inspections, and records inspections.

Comment #5: **Text of Proposed Regulations –** DPR will model air concentration in ten non-adjacent townships with the highest use in the previous year with no more than one township selected for a county. DPR decided on ten townships based on historical use data. However, future 1,3-D use is uncertain and more than 10 "high-use" townships may need to be evaluated via modeling. For that reason, OEHHA suggests that ten be used as a minimum number and that the total number of townships to be selected for modeling be re-evaluated yearly according to use data from the prior year.

Response: The draft regulations require DPR to evaluate the township with the highest 1,3-D use in each of the ten highest counties for the previous calendar year; therefore, the specific townships evaluated will be updated each year. DPR proposes ten townships to ensure that the evaluation includes the township with the highest potential air concentrations based on the amount of 1,3-D applied, the fumigation methods used to apply 1,3-D, crops, season and timing of field soil fumigations, and weather conditions. The regulations do not preclude DPR from evaluating additional townships if warranted based on use data.

Comment #6: **Text of Proposed Regulations –** OEHHA also believes the fumigation methods used (e.g., 50% soil moisture content, TIF tarping, depth of injection) greatly affect the emission of 1,3-D in the air and therefore the ambient air concentration. Therefore, DPR should also report total adjusted pounds for all townships and consider these values to select the townships for modeling.

Response: DPR will evaluate adjusted total pounds in each of the ten townships as part of the evaluation, but this detail and other specific analytical and modeling methods used for the evaluation are not specified in the regulations to enable DPR to modify and improve its methods without future rulemaking.

Comment #7: **Text of Proposed Regulations –** DPR proposes to create an annual report that will include monitoring data and estimated air concentrations from 10 high-use townships. If the acute (55 ppb) or chronic target concentrations (0.56 ppb) are exceeded, the report will include

additional actions taken to mitigate the excessive exposure and a timeline for these actions. Because preparing the report is a sequential process that includes completion of analytical testing and exposure modeling, additional data analysis, report preparation and internal review, report completion will take several months or longer. Determining any additional mitigations based on the report findings and a timeline for such actions would further delay the report release. OEHHA is concerned that delays in the report preparation process would delay protective mitigations and harm reduction for exposed bystanders. OEHHA suggests adding a timeline for the annual report to be submitted and for actions to be taken. To ensure transparency in the process, OEHHA also suggests real-time posting in one unique location on the DPR website (e.g., a dashboard) of use data (i.e., poundage, location, date, fumigation method, etc.) and, to the extent possible, of monitoring data.

Response: See response to Comment #2 regarding the timeline for the annual report. The suggestions regarding posting information on the website are valuable, but this level of detail is not needed for the regulations. This will enable DPR to modify and improve the information it posts without future rulemaking.

Comment #8: **Text of Proposed Regulations –** The most recent RMD (DPR, 2021a) established the acute target concentration of 55 ppb over a 72-hour period for non-occupational bystanders. In this regulation, DPR explains how 72-hour reference concentrations will be compared to air monitoring results, which are collected over 24-hour periods.

The point of departure used to derive the acute reference concentration was based on weight gain decrements following 3 days of 1,3-D exposure in rats (Stott et al., 1984). With respect to the point of departure (POD) chosen, on page 174 of the RCD (DPR, 2015), DPR states that the "value was considered appropriate to evaluate acute and short-term risk". OEHHA agrees with the language presented in the RCD that the POD chosen to derive the reference concentration should be applicable to estimate both acute and short-term risks (DPR, 2015). However, we also note that body weight decrements were observed even following a single exposure to 1,3-D (Cracknell, 1987). Thus, in the absence of a 24-hour acute reference concentration, OEHHA agrees with the proposed regulation stating that 24-hour monitoring data will be compared to the 72-hour acute reference concentration of 55 ppb.

Response: Thank you for the comment.

OEHHA also reiterates the importance of assessing air monitoring results in the evaluation of mitigation efforts in the annual report. OEHHA expresses some concern over relying on air modeling for evaluating the effectiveness of mitigation measures, which were shown in some instances to underestimate concentrations from 24-hour air monitoring (DPR, 2018; DPR, 2019c). Therefore, OEHHA suggests using the results from the report of the first year with "more stringent acute mitigation measures" to assess the reliability of air modeling data and the validity of a 72-hour acute reference concentration to protect residential bystanders from peak exposures to 1,3-D.

Response: The annual report will include a comparison of modeled air concentrations to monitored air concentrations for the monitoring locations that have concentrations more than

the thresholds or are included within the ten townships evaluated. This analysis will occur each year, not just the first year, to help assess and improve its modeling methods and data. This and the other analyses included in the annual report will evaluate the effectiveness of the regulations, and if necessary, describe additional actions to ensure air concentrations do not exceed the regulatory target concentrations.

Comment #9: **Text of Proposed Regulations –** OEHHA also recommends the following analysis be included in the modeling evaluation:
(1) For townships to be evaluated, OEHHA suggests calculating statistics at each modeled receptor in a township and report the range of the highest 24-hr, the highest 72-hr, and the 1-year average concentrations. Based on the previous technical report, there are 1,369 receptors in a township modeling. The concentration range summarized from 1,369 receptors can be helpful to identify potential high risk and reduce modeling uncertainties.

(2) For monitoring locations to be evaluated:
a. Besides modeling concentration at the exact monitoring location, OEHHA suggests DPR consider evaluating the entire township (1369 receptors) where the monitoring site is located, similarly to what will be done for the ten townships selected based on 1,3-D use. This evaluation can provide more data and, therefore, help overcome uncertainties of modeling evaluation.

b. When summarizing 1-year average concentrations of modeling data, OEHHA suggests DPR consider conducting the two following calculations: 1) the average of estimated 24-hr concentrations on 52 sampling days to be compared with yearly average concentration calculated from the monitoring data; and 2) the average of daily concentrations in a year to be compared with the regulatory target concentration for cancer risk.

Response: DPR will consider these suggestions, but this level of detail does not need to be specified in the regulations. This will enable DPR to modify and improve its methods without future rulemaking.

Comment 10: Text of Proposed Regulations – Will family childcares be considered as residential houses (i.e., setback 100-500 ft) or schoolsites (i.e., setback .25 mile)?

Response: As specified by 3 CCR section 6690, licensed child day care facilities are included in the definition of schoolsites and the existing requirements in 3 CCR section 6691 apply. Family day care homes or other unlicensed child care facilities are considered occupied structures and the draft regulations will apply.

Comment #11: Initial Statement of Reasons. Use of the HYDRUS model to predict soil fumigant emissions and reduce 1,3-D exposure is a novel and innovative approach. OEHHA staff have had the opportunity to review draft documents that describe the relevant methodology, have commented extensively on this model and its use to predict airborne 1,3-D exposure, and approve of this approach to estimate soil fumigant emissions. However, because OEHHA staff have no experience working with the HYDRUS software, our comments are limited in scope. DPR's modeling of 1,3-D emission was reviewed by external experts (Page 5, paragraphs 1 and

3), but that report is not yet publicly available. We recommend that DPR share this document with the general public.

Response: No response needed. The external reviews are available upon request.

Comment #12: Initial Statement of Reasons. OEHHA concurs with the use of a combination of setback distance, maximum application rate and application block size to limit acute exposures (pages 6-9). However, multiple "overlapping" applications present a more complicated scenario for regulators and applicators. Although this scenario is well-described in the Initial Statement of Reasons, OEHHA notes that the description in the draft Field Fumigation Requirements is brief and does not address the time element. OEHHA recommends that the final Field Fumigation Requirements include one or more examples of overlapping applications and how this would impact the size of the proposed application, setback and application rate.

Response: Examples are not requirements, so they are inappropriate to include in the regulations or the document incorporated by reference. DPR plans to include examples as part of supplemental information to CACs.

Comment #13: Initial Statement of Reasons – While some of the new fumigation methods are supported by preliminary data from DPR's 2020-2021 pilot study, it may be imprudent to rely on modeled air concentration estimates alone to justify the complete removal of the current cancer risk protection provided by the township cap. Once applied to the soil, 1,3-D emissions continue for many weeks, and it has not yet been shown that the proposed mitigations will reduce long-term regional air concentrations as predicted. Secondly, model uncertainties or other factors such as compliance, water supply or use patterns may reduce the impacts of mitigation on long-term exposure. Also, historic 1,3-D use suggests that the total use of 1,3-D could rise significantly from current levels under a "no township cap" scenario. Therefore, OEHHA is concerned that complete removal of the township cap is being implemented before the long-term effects of mitigation are known. OEHHA recommends a gradual phase-out of the township cap. This would allow sufficient air monitoring and modeling of air concentrations in high use areas to confirm the efficacy of these mitigations and ensure that residents in these same areas are sufficiently protected.

Response: DPR has accounted for all feasible uncertainties. DPR's modeling data and methods have been peer-reviewed. Additionally, other state regulatory agencies, such as CARB, also rely on modeling to evaluate whether future regulatory actions will achieve air quality standards. DPR agrees that 1,3-D emissions can continue for several weeks, and the draft requirements are based on estimated emissions for 21 days following fumigation. Emissions after this period are negligible. Additionally, to estimate long-term air concentrations, DPR estimates the 95th percentile of one-year air concentrations as a surrogate for the 95th percentile of 70-year concentrations. This health-protective assumption accounts for model uncertainties. The annual report will evaluate the uncertainties and effectiveness of the regulations, and if necessary, describe additional actions to ensure air concentrations do not exceed the regulatory target concentrations.

It is infeasible to develop or justify regulations based on compliance concerns (i.e., potential illegal applications). For example, the draft setback distances are based on compliance with specified application rate and acreage limits. It is infeasible to estimate and justify a higher application rate or acreage and propose the resulting setback distances based on the assumption of noncompliance.

While the setback distance and related requirements are designed to mitigate the acute risk to non-occupational bystanders, they will also reduce long-term exposures and address cancer risks to non-occupational bystanders from 1,3-D use. This determination is based on an analysis of 1,3-D use data from 2013-2017. Use of 1,3-D was historically high during 2013-2016 due to DPR granting waivers from the township cap use limit. Even assuming use consistent with the highest worst-case scenario use from that time period, DPR estimates that implementation of the proposed 1,3-D regulations would result in an estimated highest one-year average air concentration of 0.35 ppb. This is well below DPR's regulatory target concentration for cancer risks to non-occupational bystanders of 0.56 ppb as a 70-year average. This concentration represents only one of 1,685 statewide township-year combinations evaluated by DPR—most of which involved considerably lower use and one-year average air concentrations. The 1,3-D use in a township with the highest historical use would need to increase by more than 36 percent each year for several years to (1) reach the estimated revised township cap and (2) have more than a five percent chance of exceeding the 0.56 ppb regulatory target concentration. DPR does not expect use to increase so far even beyond the highest worst-case historic use. Moreover, the five-year average 1,3-D air concentrations are significantly less than the one-year averages.

Comment #14: Initial Statement of Reasons – In section 6448.4, subsection (a)(2) (page 14, paragraph 3), DPR proposes to evaluate monitored air concentrations or modeled estimates for the townships listed in subsections (a)(1). These values will be compared to "the estimates of air concentrations used to develop the proposed regulation. Where possible, the estimated air concentrations will also be compared to measured concentrations from air monitoring." OEHHA agrees with the defined comparisons. OEHHA recommends that the draft final regulatory language be revised to include this definition instead of the less transparent "expected range."

Response: DPR made the suggested change.

Comment #15: Analysis of the sufficiency of the acute measures – Based on extensive computer modeling, DPR predicts that the proposed mitigation measures in section 6448 will result in a sharp decline in 1,3-D air concentrations that would make a township cap unnecessary. OEHHA staff and others have reviewed the development of these modeling efforts since 2018 and feel these modeled estimates greatly improve DPR's ability to predict 1,3-D soil emission and air concentrations. However, the underlying models may be unable to account for all chemical, environmental, weather-related and terrain factors that contribute to localized 1,3-D air levels and thus may not adequately predict residential bystander exposure.

Preliminary field studies suggest that increased soil moisture can reduce acute emissions, however the effectiveness and variability of this mitigation on long-term exposure and cancer risk is not yet known. It is also unclear if the total use or pattern of use will remain unchanged or increase in the absence of a township cap. For example, when the current use restrictions

(increased cap 50% and banned December applications) were put in place, 1,3-D applications increased in the months before and after December. This shift in application timing may have contributed to the observed exceedances of acute or chronic target levels. As mentioned earlier, since both model and use uncertainties may impact these mitigation measures, OEHHA is concerned that the predicted reduction in long-term exposure is not yet known and could be diminished or reversed by increased total use or altered use patterns.

Response: See response to Comment #13.

Comment #16: Analysis of the sufficiency of the acute measures – Additionally, in the case of chloropicrin and 1,3-D combination products, OEHHA is concerned that removal of the township cap on 1,3-D would allow increased exposure to another known carcinogen, chloropicrin. Removal of the cap as well as other mitigation measures should consider the potential increased risk from other pesticides.

Response: An addendum to the economic analysis of the draft regulations by CDFA and the University of California, Davis indicates that more than 95 percent of tree and grape applications will shift to a fumigation method with lower emissions rather change active ingredient. Also see response to Comment #13.

Comment #17: Updates to HYDRUS-simulated flux estimates of 1,3-Dichloropropene maximum period-averaged flux and emission ratios. Table 3 reported field capacities of 21 soils at 3-9 inch (7.6 – 22.9 cm) as volumetric water content (0.098-0.0350 cm3 cm-3) and percentage of field capacity (25% - 116%). Appendix A-1 reported soil moisture used in the modeling, which included volumetric water contents at 5 different depths (0-10, 10-20, 20-30, 30-50, 50-70, and 70-120 cm) and values varied at different depths. It is unclear how the values in these two tables are related. Two references (Brown et al., 2022; Tule et al., 2022) cited in this document may have provided related information but were not provided to OEHHA for review. OEHHA suggests that DPR provide additional clarification for these two tables and explain how a percentage of soil field capacity can exceed 100% (Table 3, Soil #20).

Response: Clarifying language has been added to the document.

Comment #18: "Modeling for mitigation measures to reduce acute exposure from 1,3-Dichloropropene, modeling approach #2. OEHHA recommends DPR systematically evaluate the available weather data for each group of field fumigation methods and use the worst-case scenario data when developing mitigation measures for acute exposure to 1,3-D.

Response: For the statewide mitigation purpose, the selection of meteorological data is not just based on the results of individual stations, but also considers predicted exposure potentials and reported use amounts/patterns of 1,3-D. Also see response to the Monterey Bay Air Resources District's Comment #4 on page 19.

Comment #19: Modeling for mitigation measures to reduce acute exposure from 1,3-Dichloropropene, modeling approach #2. Parlier station was selected for its San Joaquin Valley location and because the high emission FFM 1206 is the dominant application method in

that region. Since mitigation measures are intended to protect bystanders from acute exposure of any potential applications, the worst-case scenario (which may not be the most common scenario) for the combination of the weather condition and FFMs should be considered and evaluated systematically.

Response: We revised this paragraph on the selection of weather stations for mitigation modeling. Please see page 4, the 2nd paragraph of section 3.2. In the revision, we clarified that: "For the statewide mitigation purpose, the selection of meteorological data is not just based on the results of individual stations, but also considers the regional comparison (inland vs. coastal areas) for the predicted exposure potentials and reported use amounts/patterns of 1,3-D. Therefore, the meteorological conditions in the inland areas, which are conservatively represented by Parlier data, are used for acute mitigation modeling in this study."

FFM 1206 represents the nontarped and non-TIF tarp methods which are the predominant methods of 1,3-D in the inland areas.

Related concerns include but are not limited to:

(1) Has FFM 1206 ever been used in other areas with weather conditions generating higher exposure than the San Joaquin Valley?

Response: Yes, nontarped and non-TIF tarp methods are also used in coastal areas. For the regional comparison of predicted exposure potentials, we stated that in the revision that "the average over all coastal stations is lower than that over the inland stations."

(2) Does Parlier station and FFM 1206 represent the worst-case conditions of the San Joaquin Valley?

Response: Yes, Parlier represents the worst-case condition in the San Joaquin Valley. More detailed results are presented in the revised report: "Results showed that, with the same amount of 1,3-D emissions, meteorological data at Watsonville in Santa Cruz County generates the highest exposure potential, followed by Parlier in San Joaquin Valley."

(3) Is it possible that FFMs other than 1206 could cause high exposure with the worst-case weather in coastal areas?

Response: The predominant methods in coastal areas use TIF. TIF methods are unlikely to cause higher exposure compared to nontarped and non-TIF tarp methods with the same weather data. A few crops in coastal areas use fumigation methods with high emissions (e.g., Brussels sprouts use untarped, shallow injection), but these crops apply 1,3-D at low rates (<100 pounds per acre), so exposures will be low.

Comment #20: Modeling for mitigation measures to reduce acute exposure from 1,3-Dichloropropene, modeling approach #2. DPR mentioned that the median field capacity for all 21 soils is approximately 50%. Therefore, the median values of 21 setback distances may be estimated with the flux time series generated from the soil with the field capacity close to 50%, but this has not yet been confirmed. Since the minimum 50% field capacity is required by the

proposed regulation, the corresponding soil types related to the final selected setback values should be included in the report for the purpose of transparency.

Response: A new figure was added in the report (page 10) showing the data for individual soils (x= soil water content, y=setback distances) with FFM 1206 as an example. Additional data analysis was conducted for the soils with water contents measured about 50% (page 10): "There are 7 soils (#4, 8, 12, 13, 15, 19, and 21) with measured water contents close to 50% of field capacity (49 – 54%). The median setback distances over the 7 soils are 1272 ft for applications during Mar-Oct and 2457 ft during Nov-Feb, the same as the medians over all soils (Table 4).

Comment #21: Modeling for application factors of 1,3-Dichloropropene, modeling approach #2. DPR selected a field fumigation method (FFM) for each of 8 groups of FFMs and used its flux time series for the modeling. The selected FFM was the same as the one used in the setback modeling, but this report does not describe the selection procedure or standard. OEHHA suggests the report add similar description as the one done in the setback report.

Response: The suggestion has been taken. The first paragraph of section 3.1 (page 3) has been revised for the consistency with the setback modeling report: "According to the updated 1,3-D regulation, 23 field fumigation methods (FFMs) are allowed in California (Appendix II), including 18 FFMs currently registered and 5 FFMs newly proposed (24-inch injection and 50% TIF methods). The FFMs were categorized into 8 groups according to injection depth, tarpaulin type, and emission ratio (Table 2). For each group of FFMs, the method with the highest emission ratio was selected as the representative FFM and modeled for conservative estimation of AF (Table 2)."

Comment #22: Modeling for the township cap of 1,3-Dichloropropene applications, modeling approach #2. The 95th percentile of yearly average concentrations for regression. The study used a linear regression to estimate concentration levels of 95% receptor-years for 1,3-D annual use amount of various township-years and then compared it with the target 0.56 ppb. Although the cancer risk health target of "0.56 ppb is a 70-year average that should be achieved at least 95 percent of the time" (DPR, 2016), the township cap is used to limit 1,3-D use for a single year. Therefore, concentrations estimated for receptor-years by AERFUM are reasonable data points for the analysis although they cannot represent 70-year exposure of non-occupational bystanders. However, using the 95th percentile of concentrations as a dependent variable of the regression has manually reduced the data variation. The prediction interval used in the township cap estimation may have not worked as a conservative estimate as expected. Other statistical regression methods such as quantile regression or logistic regression may be more appropriate to estimate the 95th percentile of a concentration distribution or the 95th probabilities of 0.56 ppb within a township with 1,3-D annual use at certain levels. OEHHA suggests DPR evaluate more statistical methods to find a better suited method for the estimation.

Response: The suggestion has been taken. A logistic regression was conducted as an alternative statistical method for the estimation of the township cap. A new appendix ("Township cap estimation based on logistic regression") was added for more information.

Comment #23: Modeling for the township cap of 1,3-Dichloropropene applications, modeling approach #2. Potential underestimate of exposure levels at some receptors. With the current modeling setup, air concentrations at receptors near the edge of a center township may have been underestimated because some pesticide uses outside the simulation area can potentially cause exposure at those receptors. OEHHA suggests that DPR design modeling domains around receptors in smaller areas, such as center sections, instead of center townships. The estimations of multiple sections within the center township can be combined to form the concentration distributions of that township.

Response: The suggestion has been taken. An extended simulation domain with a 5x5 township area was tested with two case studies (Parlier and Watsonville). The increase in the 1,3-D five-year average concentration within the center township was less than five percent for both cases. See the new appendix ("Modeling with extended simulation domain") for more information.

Comment #24: Modeling for the township cap of 1,3-Dichloropropene applications, modeling approach #2. Township selection for modeling. The study selected the modeled townships to be consistent with the previous township cap study and in the areas with air monitoring sites. The eight selected townships are located in both inland and coastal regions. OEHHA suggests that townships should be selected based on potential high exposure (high use regions with the worst-case weather data).

Response: We selected the center townships for modeling based on high-use regions with local weather data. This paragraph was revised to explain the two-step procedure for township selection (page 7):

"The center townships for modeling are selected by the following steps:
• High-use areas are observed from Sacramento Valley to Imperial Valley. For the consistency with the previous cap estimation (Tao, 2016), the townships for modeling were selected in the areas monitored by DPR's Air Monitoring Network for 1,3-D (DPR, 2022), including Ripon, Watsonville, Parlier, Shafter, Santa Maria, and Oxnard.

• Top townships by 1,3-D uses in the above areas were considered for modeling. High-use townships are usually adjacent to each other. In this case, only one of them was modeled to reduce the bias from shared townships in the simulation domain of 3×3 townships. For example, M15S22E was selected to represent a cluster of 5 connected high-use townships in the area of Parlier (M15S22E, M15S23E, M16S20E, M16S21E, and M16S22E). Finally, eight townships with high uses of 1,3-D were selected for modeling (Table 3)."

In addition, regression and estimation should be done for each region to identify various relationships between the use pattern and yearly exposure in different regions; unless analysis shows they do not exhibit significant differences.

Response: The suggestion has been taken. The regional estimates for township caps and their spatial variability were evaluated in the revision, see the new appendix ("Spatial variability of township cap estimates"). We also concluded that "The estimate with all data points (204,200 ATP, Figure 3) generally reflects the median value over the regional results (Table 6)."

Comment #25: Modeling for the township cap of 1,3-Dichloropropene applications, modeling approach #2. Mitigation scenarios. This could be the most challenging part in the procedure. It is uncertain how farmers will implement the proposed mitigation measures for acute exposure once they go into effect. In addition, besides combining results of two scenarios for township cap estimation, the township cap estimation should also be performed for each of the scenarios; unless analysis shows they do not exhibit significant differences.

Response: The two scenarios were developed for representing the two extreme conditions of future implementation of the new regulation. Yes, they are expected to exhibit significant differences in the estimation of township cap. We did not further investigate the scenarios in this report, but proposed to do annual evaluations on the high-use areas when field data for 1,3-D uses after the new regulation goes into effect. Additionally, DPR subsequently revised the draft regulations to require fumigations for tree orchards and grape vineyards to use a 24-inch injection or TIF fumigation method due to the higher anticipated annual air concentration. The analysis shows that the estimated highest possible one-year average 1,3-D concentration is 0.65 ppb for the scenario that assumes tree and grape fumigations continue to use the 18-inch injection method. Requiring a 24-inch injection or TIF fumigation method will reduce the estimated highest one-year concentration to 0.35 ppb.

Comment #26: Modeling for the township cap of 1,3-Dichloropropene applications, modeling approach #2. Clarification may be also needed in some other areas of the report:

- The report (Page 7-8) mentions that the flux time series used in this modeling study reflected the proposed soil moisture requirement (minimum 50% field capacity). However, as stated in Document 1 and our conversation with DPR, flux generation used all field measurements, which had a broad range of field capacity (25-116%). Therefore, flux used in the modeling needs further clarification.

Response: In this report, "50%" was only used for the "50% TIF method." We think that this comment is for the following sentence on page 8, "it's not expected to result in significant reduction on the annual average concentrations in addition to that from the minimum requirements (e.g., higher soil moisture)."

As explained in the setback modeling report "SetbackModeling_Seasonal.docx," the requirement of a minimum 50% field capacity is reflected by the median over the 21 modeled soils, rather than any individual soil.

- The last paragraph of page 7 mentioned 18 FFMs are allowed in California with the updated regulation, which is inconsistent with the FFMs listed in previously received regulatory document. Draft 1,3-Dichloropropene Field Fumigation Requirements listed 23 FFMs in California. Revision is needed for consistency purpose.

Response: Report revised for 23 FFMs. In the draft 1,3-Dichloropropene Field Fumigation Requirements, some of the methods were labelled as "not allowed" and thus not modeled for mitigation measures. Note that some of the "not allowed" methods are modeled by HYDRUS for emission flux profiles in order to calculate their historical VOC emission. DPR now proposes to

allow the methods previously designated "not allowed" and they were assigned setbacks assuming worst-case emissions. For example, tarped fumigation methods were assigned setbacks for untarped fumigations.

- The first paragraph of Page 8 mentioned the term "setback duration", which is not mentioned in previously received regulatory document.

Response: Setback durations and setback distances have been described in the report "SetbackModeling_Seasonal.docx." See Table 4 and associated discussions in that report.

The concept of "setback duration" has been used in the previous regulatory documents, including the product label: "No person shall be present at this structure at any time during the seven consecutive day period following application," and the 1,3-D recommended permit conditions: "If a structure is within 100 feet of the application block, no person shall be present at this structure at any time during the application and during the seven-consecutive day period after the application is complete."

Monterey Bay Air Resources District Comments

Comment #1: General Comment. MBARD is concerned the modeling approach used by the Department of Pesticide Regulation (DPR) to assess health risk from 1,3-dichloropropene is not protective of public health. The risk assessment methodology used in this document is not consistent with the Office of Environmental Health Hazard Assessment (OEHHA) Guidance Manual for Preparation of Health Risk Assessments (February 2015) referenced in some of the documents.

Response: This comment on risk assessments is outside the scope of consultation under FAC section 14024, which requires DPR to consult on whether the regulations reduce exposure to DPR's regulatory target concentrations. However, OEHHA's guidance manual is based on the mandates in the Health and Safety Code. DPR is required to follow the health risk assessment and mitigation process mandated by the Food and Agricultural Code, which includes extensive consultation with OEHHA on its risk assessment.

Comment #2: HYDRUS_Flux, Document Name: Updates to HYDRUS-simulated flux estimates of 1,3-dichloropropene maximum period-averaged flux and emission ratios, Colin Brown, dated June 10, 2022. DPR should use consistent references and regulatory concentrations across their documents. In the various documents provided, there is a regulatory concentration for acute exposure of 55 ppb averaged over 72 hours and a target concentration of 0.56 ppb for cancer exposure. On page 4, the report states, "setback distance remain no greater than the 55 ppb regulatory concentration specified by its 2021 Risk Management Directive (Henderson 2021) …". Please clarify whether this is the same reference which is called "DPR 2021" in the document "Modeling for the township Cap of 1,3-Dichloropropene applications, modeling approach #2, dated 6/16/2022"? The 6/16/2022 paper includes the additional clarification that this concentration is for acute exposure of 55 ppb averaged over 72 hours

Response: The two citations reference the same document. DPR revised the "DPR 2021" reference to "Henderson 2021" to make them consistent.

Comment #3: SetbackModeling_Seasonal, Document Name: Modeling for mitigation measures to reduce acute exposure from 1,3-dichloropropene, modeling approach #2, Yuzhou Luo, Ph.D., dated 6/16/2022. On page 2, an acute exposure value of 55 ppb averaged over a 72-hour period is reported as the regulatory target concentration. However, there is no established acute reference exposure level (REL) for 1,3-Dichloropropene identified by OEHHA. In addition, OEHHA acute exposure is based upon the maximum 1-hour concentration and not an average over a period of 72 hours. Please explain this inconsistency with OEHHA methods for assessing acute exposure.

Response: See response to Comment #1.

Comment #4: SetbackModeling_Seasonal, Document Name: Modeling for mitigation measures to reduce acute exposure from 1,3-dichloropropene, modeling approach #2, Yuzhou Luo, Ph.D., dated 6/16/2022. On page 4-5 the document states, "Results showed that, with the same amount of 1,3-D emissions, meteorological data at Parlier generate higher exposures than most of other stations, but less than some in coastal areas such as Watsonville (WBAN 23277). Although not capturing the worst-case condition in California, Parlier data are used to represent San Joaquin Valley with high reported uses and high observed air concentrations of 1,3-D." Based on these statements, DPR should develop separate worst-case setback recommendations for inland and coastal regions.

Response: This paragraph has been revised for the selection of weather station for mitigation modeling. Please see page 4, the 2nd paragraph of section 3.2. In the revision, we clarified that: "For the statewide mitigation purpose, the selection of meteorological data is not just based on the results of individual stations, but also considers predicted exposure potentials and reported use amounts/patterns of 1,3-D. Therefore, the meteorological conditions in the inland areas, which are conservatively represented by Parlier data, are used for acute mitigation modeling in this study."

Watsonville is also not representative of coastal regions where "The predicted exposure potentials at other coastal stations (Salinas, Santa Maria, and Oxnard) are generally lower than the inland stations, and the average over all coastal stations is lower than that over the inland stations." (page 4)

In addition, 1,3-D exposures in Watsonville and other coastal areas are expected to be low due to the predominant use of TIF fumigation methods and low application rates. In many cases the proposed minimum and current setback distance of 100 feet will be required, even if the setbacks are based on Watsonville meteorological data. DPR considered proposing setbacks based on Watsonville meteorological data as well as different setbacks for different regions but both are infeasible at this time. First, DPR would be unable to meet the court-ordered deadline due to the time it would take to make either change. Second, having setbacks that differ by region would add complexity to the regulations and lead to compliance and enforcement concerns, especially since DPR already proposes different setbacks for winter and non-winter seasons.

Comment #5: SetbackModeling_Seasonal, Document Name: Modeling for mitigation measures to reduce acute exposure from 1,3-dichloropropene, modeling approach #2, Yuzhou Luo, Ph.D., dated 6/16/2022. Please explain where DPR obtained the meteorological data sets used in the modeling. For example, the San Joaquin Valley Air Pollution Control District (SJVAPCD) provides access to meteorological data to use for AERMOD in their region on their website. SJVAPCD does not have a meteorological data set for Parlier. Please confirm the meteorological data used for this study for San Joaquin Valley was representative and complete.

Response: The data source has been described in the report (page 5): "Meteorological data are taken from the station at Parlier operated by National Weather Service (NWS), WBAN 93193."

Comment #6: AFModeling_Seasonal, Document Name: Modeling for application factors of 1,3-dichloropropene, modeling approach #2, Yuzhou Luo, Ph.D., Colin Brown, dated 6/16/2022. On page 4, the document states the HYDRUS modeling results suggest that temperature effects on cumulative flux are likely to be minor compared to regional or seasonal variation in soil properties. The meteorological conditions for inland areas versus coastal areas are very different. Does DPR have temperature modeling to support this conclusion?

Response: The modeling results to support this conclusion are included in Brown 2019.

Comment #7: AFModeling_Seasonal, Document Name: Modeling for application factors of 1,3-dichloropropene, modeling approach #2, Yuzhou Luo, Ph.D., Colin Brown, dated 6/16/2022. On page 4, and Table 4, MBARD can provide DPR with a current meteorological dataset for AERMOD for Watsonville, Monterey, and Salinas.

Response: DPR appreciates the offer. As mentioned in the report, the meteorological data were prepared by MetProc, a tool developed by DPR based on the USEPA's AERMET to prepare meteorological data for AERMOD. The data generated by MetProc have been compared and verified with the data from ARB and air districts. See the following technical report for more information:
Luo, Y. (2017). Meteorological data processing for ISCST3 and AERMOD.
https://www.cdpr.ca.gov/docs/emon/pubs/ ehapreps/analysis_memos/metproc_final.pdf

Comment #8: AFModeling_Seasonal, Document Name: Modeling for application factors of 1,3-dichloropropene, modeling approach #2, Yuzhou Luo, Ph.D., Colin Brown, dated 6/16/2022. On page 8, the document states, "For demonstration purposes, sensitivity analysis is conducted for Parlier only, based on the high uses of 1,3-D in the surrounding areas". Please clarify whether a sensitivity analysis was conducted for other areas and if not, why was a coastal area not also used to test sensitivity of the model settings? As stated in the setback modeling document, exposures in Watsonville were higher than Parlier. There are factors other than high use, such as meteorological conditions, which could contribute to differing results which should be considered in a sensitivity analysis.

Response: As shown in Table 6, the sensitivity analysis in this study is designed to test the modeling configurations in terms of source size (20 vs. 56 acres), simulation domain size (section vs. township), and receptor spacing (200 m vs. 50 m). Sensitivity analysis is not used to compare the modeling results with different meteorological data.

Comment #9: TCModeling_Seasonal, Document Name: Modeling for the township cap of 1,3-dichloropropene applications, modeling approach #2, Yuzhou Luo, Ph.D., dated 6/16/2022. MBARD recommends using AERSCREEN to determine the worst-case concentration scenario for application of 1,3-dichloropropene. This screening method allows for modeling without the need for hourly meteorological data.

Response: AERSCREEN only models a single source, so it is not appropriate for the purpose of township cap modeling where a large number of sources (i.e., 1,3-D application events) are involved. For example, there are 1,412 sources in the modeling for M15S22E (Parlier) and 1,858 sources for M12S02E (Watsonville).

Comment #10: TCModeling_Seasonal, Document Name: Modeling for the township cap of 1,3-dichloropropene applications, modeling approach #2, Yuzhou Luo, Ph.D., dated 6/16/2022. Please explain why DPR uses township cap as the unit for evaluating risk. This is inconsistent with other state agencies which use census tracts for evaluating risk. For example, the CalEnviroScreen 4.0 tool reports pollution burden by census tract: https://oehha.ca.gov/calenviroscreen/report/calenviroscreen-40.

Response: The draft regulations no longer include a township cap. That said, use of agricultural pesticides and field locations are reported by township and section, not census tract. With a few exceptions, all townships are 36 square miles in area, so the same limit applies to all townships, making compliance and enforcement easier. Census tracts vary in area so each tract would likely have its own unique limit, making compliance and enforcement difficult, with no advantages in health protection.

Comment #11: TCModeling_Seasonal, Document Name: Modeling for the township cap of 1,3-dichloropropene applications, modeling approach #2, Yuzhou Luo, Ph.D., dated 6/16/2022. On page 2 and 12, the regulatory concentration target of no more than 0.56 ppb as a 70-year average is reported as the level to control lifetime cancer risk. What is the risk value that equates to the concentration, such as is the cancer risk one in a million, 10 in a million, 100 in a million?

Response: The concentration is equivalent to one excess case of cancer per 100,000 people, as specified in DPR's 2016 risk management directive.

Comment #12: TCModeling_Seasonal, Document Name: Modeling for the township cap of 1,3-dichloropropene applications, modeling approach #2, Yuzhou Luo, Ph.D., dated 6/16/2022. As previously commented, on page 2, an acute exposure value of 55 ppb averaged over a 72-hour period is reported as the regulatory target concentration. However, there is no established acute reference exposure level (REL) for 1,3-dichloropropene identified by OEHHA. In addition, OEHHA acute exposure is based upon the maximum 1-hour concentration and not

an average over a period of 72 hours. Please explain this inconsistency with OEHHA methods for assessing acute exposure.

Response: See response to Comment #3.

Comment #13: TCModeling_Seasonal, Document Name: Modeling for the township cap of 1,3-dichloropropene applications, modeling approach #2, Yuzhou Luo, Ph.D., dated 6/16/2022. On page 3, "the dose calculations by stochastic simulation over age-and gender-specific parameters are not appropriate for this study." If this approach was not used, then how is public health protected when there are residents and schools in close proximity to fields where 1,3-dichloropropene is applied.

Response: The setbacks and other proposed regulations would be the same if DPR established a regulatory target dose (mg 1,3-D per kg body weight) instead of a regulatory target concentration (ppb) because this would only be a change in units. The regulatory target concentration of 0.56 ppb provides lifetime protection for a 70-year exposure. This includes the most sensitive period for infants and children.

Comment #14: TCModeling_Seasonal, Document Name: Modeling for the township cap of 1,3-dichloropropene applications, modeling approach #2, Yuzhou Luo, Ph.D., dated 6/16/2022. On page 4 third paragraph, it states, "…ADD was calculated from the joint probability distribution between the predicted annual air concentrations of 1,3-D and age- and gender- specific parameters (breathing rate, body weight, and time spent in different locations)." This seems to contradict the following statement on page 3 "…the dose calculations by stochastic simulations over age- and gender- specific parameters are not appropriate for this study." Please clarify this inconsistency.

Response: This paragraph reviewed the literature, compared the previous studies and "this study," and concluded that the approaches in the previous studies "are not appropriate for this study." So, this is not an inconsistency, but describes the two different approaches in the previous studies vs. this study. The setbacks and other proposed regulations would be the same if DPR established a regulatory target dose (mg 1,3-D per kg body weight) instead of a regulatory target concentration (ppb) because this would only be a change in units.

Comment #15: TCModeling_Seasonal, Document Name: Modeling for the township cap of 1,3-dichloropropene applications, modeling approach #2, Yuzhou Luo, Ph.D., dated 6/16/2022. On page 4, the exposure period was done for both 70-year and 30-year. OEHHA recommends using the 30-year exposure duration as the basis for estimating cancer risk in all health risk assessments and a 70-year exposure duration for population-wide impacts. Furthermore, OEHHA recommends using census data to assess population-wide cancer risk (see OEHHA, 2015 document pages 2-4, 2-5, and 4-18). Was census data used for the 70-year exposure period? If not, please explain how the 70-year cancer exposure period was evaluated.

Response: Census data was not used for the 70-year exposure period because the draft regulations are based on individual risk, not population risk. In this study, the township cap is determined based on 1-yr average concentrations, and evaluated with 5-yr average

concentrations. It's assumed that the 5-yr simulation period is representative to any 70-year period in terms of 1,3-D use and meteorological conditions. Also applied in this study is the "low-mobility" assumption from DPR's 2016 Risk Management Directive.

Comment #16: TCModeling_Seasonal, Document Name: Modeling for the township cap of 1,3-dichloropropene applications, modeling approach #2, Yuzhou Luo, Ph.D., dated 6/16/2022. On page 4, the human cancer potency factor used for the study is reported as 5.5 x 10-5 kg x day/µg. The OEHHA cancer potency factor for 1,3-dichloropropene is 9.1E-2 kg x day/mg. In addition, OEHHA recently adopted a No Significant Risk Level of 3.7 µg/day for exposure by the oral and inhalation routes for Proposition 65 warnings for exposure to chemicals which are cancer causing. Why does DPR use a different cancer potency value from what OEHHA has documented? Does this difference result in a less conservative estimate of cancer risk?

Response: This comment is outside of the scope of consultation under FAC section 14024, which requires DPR to consult on whether the regulations reduce exposure to DPR's regulatory target concentrations. DPR consulted with OEHHA, CARB, the air pollution control districts, and CDFA on the acute regulatory target for 1,3-D, which is set at 55 ppb. This value takes into account the uncertainty in the cancer mode of action, and serves as the basis for this regulatory action. OEHHA established the no significant risk level (NSRL) for 1,3-D through an independent regulatory process to provide compliance assistance for Proposition 65. NSRLs are safe harbor warning levels, not use restrictions or regulatory targets.

Comment #17: TCModeling_Seasonal, Document Name: Modeling for the township cap of 1,3-dichloropropene applications, modeling approach #2, Yuzhou Luo, Ph.D., dated 6/16/2022. On page 6, the document states the same 2013-2017 5-year meteorological data set was also used in other modeling studies for 1,3-dichloropropene. However, OEHHA recommends using the most recent 5-year meteorological datasets in risk assessments. This data can be acquired from the air districts depending on which region DPR includes in the model. Based on the information in Table 2, many of the modeling approaches used in the current study were different from previous studies. Therefore, please explain why DPR used an outdated 5-year meteorological data set for the current study. It would have been appropriate and consistent with OEHHA guidelines to use 2016-2020 or 2017-2021 depending upon when the modeling was done. Finally, an updated meteorological data set would have also been consistent with the HYDRUS modeling which was based upon soil sampling done in 2020 and 2021 and referenced in the document Brown, 2022.

Response: DPR uses the combination of meteorological data and DPR's Pesticide Use Report (PUR) database for its modeling. Since 2017, 1,3-D applications in December have been prohibited. Therefore, the use data reported after 2017 do not reflect use throughout the calendar year. The use of PUR data before 2017 is more consistent with the proposed changes on the regulation, which proposes an extended period of restricted use between November and February, replacing the December ban in place under the township cap.

DPR considered using different time periods for the meteorological data and the 1,3-D use data but determined that the two data sets should be for the same time period because weather

conditions influence use patterns. For example, product labels prohibit fumigations when soil temperatures are outside a specified range. Some labels also have wind speed restrictions. Additionally, fumigations cannot occur if the soil is too wet due to rainfall. After the proposed acute mitigation measures go into effect, DPR will be able to model actual use data instead of estimated use data and incorporate meteorological data for the same more recent time period to determine the township cap if needed.

Comment #18: TCModeling_Seasonal, Document Name: Modeling for the township cap of 1,3-dichloropropene applications, modeling approach #2, Yuzhou Luo, Ph.D., dated 6/16/2022. On page 9, the document states a flagpole receptor height of 1.5 meters was utilized. The California Air Resources Board's (CARB) Gasoline Service Station Risk Assessment Technical Guidance (2022) document assumes a flagpole height of 1.2 meters, which is commonly used in risk assessment modeling by air districts. OEHHA guidance for the inhalation pathway for a health protective approach is to use a flagpole height that will result in the highest predicted downwind concentration (i.e. smaller flagpole height). Please explain why DPR used a flagpole receptor height of 1.5 meters.

Response: 1.5 m is considered as an average human inhalation height, as stated in the report (page 9) "Receptor height for the receptors is 1.5 m above the ground surface to mimic the breathing height of an adult." Additionally, the air concentration difference between the two heights is negligible at the proposed setback distances particularly for receptors (people) inside occupied structures.

The same height has been used in all DPR previous modeling studies on soil fumigants. It's also recommended by many other agencies including the air districts, e.g., Santa Barbara County air pollution district, "2022 Modeling Guidelines for Health Risk Assessments," https://www.ourair.org/wp-content/uploads/apcd-15i.pdf.

Comment #19: TCModeling_Seasonal, Document Name: Modeling for the township cap of 1,3-dichloropropene applications, modeling approach #2, Yuzhou Luo, Ph.D., dated 6/16/2022. On page 9, the document states, "When the GIS data for field boundaries become available, the actual coordinates of the treated field can be modeled…the results for township cap modeling are expected to be similar to those with source randomization." Please explain how the results are expected to be similar. DPR should have access to GIS data for field boundaries where previous air monitoring was done near schools to test this assumption. Did DPR test this assumption using GIS coordinates of known fields where 1,3-dichloropropene has been applied?

Response: This was explained in the report, page 9: "Although the predicted hourly concentrations of 1,3-D at individual receptors may significantly vary with source locations, the 95th percentile of annual average concentrations over all receptors in a section, which is used in this study to determine the township cap, is relatively stable and not sensitive to the spatial placement of sources."

Field GIS data is organized by county and year. DPR doesn't have sufficient data for all modeled areas and years in the township cap modeling. We proposed to model with field GIS data for the selected townships with high 1,3-D uses in the future as a part of the annual report.

Comment #20: TCModeling_Seasonal, Document Name: Modeling for the township cap of 1,3-dichloropropene applications, modeling approach #2, Yuzhou Luo, Ph.D., dated 6/16/2022. In Table 2 and on page 10, please explain how the concentration of 0.56 ppb was determined to be the target regulatory concentration for cancer risk?

Response: This comment is outside of the scope of consultation under FAC section 14024, which requires DPR to consult on whether the regulations reduce exposure to DPR's regulatory target concentrations. See DPR's risk characterization document (https://www.cdpr.ca.gov/docs/risk/rcd/dichloro_123115.pdf) and risk management directive (https://www.cdpr.ca.gov/docs/whs/pdf/1,3-d_directive_mitigation.pdf) for explanations of the regulatory target concentration.

Comment #21: TCModeling_Seasonal, Document Name: Modeling for the township cap of 1,3-dichloropropene applications, modeling approach #2, Yuzhou Luo, Ph.D., dated 6/16/2022. On page 11, the predicted township cap has increased from 136,000 ATP to 204,200 ATP and DPR asserts the new field fumigation practices are expected to reduce ambient 1,3-dichloropropene thus allowing more use in terms of ATP values. Does DPR intend to allow for more use of 1,3-dichloropropene based on the results of this study.

Response: DPR has deleted the draft requirement for a township cap. The proposed mitigation measures will address both acute and cancer risks from 1,3-D, and are more protective than the current township cap.

Comment #22: TCModeling_Seasonal, Document Name: Modeling for the township cap of 1,3-dichloropropene applications, modeling approach #2, Yuzhou Luo, Ph.D., dated 6/16/2022. On page 4, using the option "without the ADJ_U*", is not a regulatory option used by air districts in AERMOD. ADJ_U* adjusts the surface friction velocity parameter in the surface file (*.sfc) to improve model performance for sources that have peak concentrations under low wind and stable atmospheric conditions. Depending on your meteorological data, you should consider using meteorological data that has been adjusted.

Response: DPR considers the "without the ADJ_U" to be the regulatory default option. According to the user's guide for AERMET version 21112, page 4-54:*

*"Beginning with version 12345, the AERMET program included a **non-Default BETA option** in Stage 3 processing to adjust the surface friction velocity (u* or ustar) for low wind speed stable conditions, based on Qian and Venkatram (2011). The option is selected by including the METHOD STABLEBL ADJ_U* keyword on the METPREP pathway in the Stage 3 input file."*

In this study, the use of the option "without ADJ_U" is suggested by the model validation with 1,3-D measurements. This has been explained in the report (page 4): "Modeling performance of AERMOD has been recently evaluated by DPR (Luo, 2019a), and the results suggest that AERMOD with regulatory default settings (without the ADJ_U* option) satisfactorily predicts annual average concentrations of 1,3-D in high-use areas of California".*