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MEMORANDUM

To: TEHAMA COUNTY DEPARTMENT OF AGRICULTURE  
Ms. Doni Rulofson, Agricultural Commissioner  
1834 Walnut Street / PO. Box 38  
Red Bluff, CA 96080

From: Julie Henderson  
Director, California Department of Pesticide Regulation  
916-445-4000

SUBJECT: **In the Matter of Tehama County and Nutrien, Ltd.**  
Request for Approval of New Nontarpaulin/Tree-Hole 1,3-Dichloropropene Field Fumigation Method and Reduced Volatile Organic Compound Emissions Field Fumigation Method

**DECISION**

**(California Code of Regulations, Title 3, sections 6448.3 and 6452)**

**Summary**

In accordance with Title 3, California Code of Regulations (3 CCR), section 6448.2, the Tehama County Agricultural Commissioner (CAC) submitted a request to allow a new nontarpaulin/tree-hole fumigation method for 1,3-Dichloropropene (1,3-D) to treat individual tree-hole sites (Field Fumigation Method (FFM) Code 1230). As part of the Department of Pesticide Regulation's (DPR's) efforts to mitigate the potential health effects of 1,3-D and reduce volatile organic compound (VOC) emissions, this fumigation method is currently not allowed as specified in Title 3, California Code of Regulations (3 CCR) section 6448.2(d). However, the regulations include a provision for the DPR Director to grant interim approval of fumigation methods with emissions no greater than the field fumigation methods allowed in the regulations, as long as the method meets the criteria set forth in 3 CCR sections 6448.3 and 6452. DPR has completed its evaluation of the nontarpaulin/tree-hole fumigation method and as set forth in more detail below, has determined that this fumigation method meets the criteria set forth in 3 CCR sections 6448.3 and 6452. Effective September 3, 2024, DPR grants approval for interim use of nontarpaulin/tree-hole fumigation method (FFM 1230) with the restrictions described in the attached document for three years. Due to labeling restrictions, this method cannot be used with products containing a combination of 1,3-D and chloropicrin.

Certain product labels for 1,3-D allow for a specialized type of application known as a "tree-hole" or "tree planting site" application. Such applications are typically used in orchard replant scenarios where dead or diseased trees must be selectively removed and replaced. Whereas most 1,3-D applications involve the tillage and application of 1,3-D throughout an entire field via shank injection, tree-hole applications are dispersed individually or in isolated clusters within an existing orchard, the soil prepared by backhoe and the fumigant injected by a hand-held probe or injection auger. More recently, tractor-mounted attachments have become available to automate the injection process. Based on the information provided by the Tehama CAC and Nutrien, Ltd., this nontarpaulin/tree-hole fumigation method can be used with the restrictions described below and classified as a "low-VOC emission method."

### **Background**

1,3-D is a field fumigant and VOC and contributes to the formation of ozone, a major air pollutant in several regions of California. Under the federal Clean Air Act, California's State Implementation Plan for ozone includes an element to track and reduce VOC emissions from pesticides. In 2008, DPR adopted regulations (3 CCR sections 6447.3, 6448-6452.3) to control VOC emissions from fumigants during the May–October peak ozone season in five regions that do not comply with the federal air quality standard for ozone (nonattainment areas, (NAAs)): Sacramento Metro, San Joaquin Valley, Southeast Desert, South Coast, and Ventura. 1,3-D also has the potential to cause a variety of adverse health effects, including cancer. As a toxic air contaminant, DPR revised the 1,3-D regulations (3 CCR sections 6448-6448.4) to mitigate the potential health effects and they went into effect on January 1, 2024. Both sets of regulations only allow fumigation methods for which DPR has adequate data to determine health mitigation measures and VOC emission rates. However, the regulations include provisions for interim approval of new fumigation methods, provided the methods meet certain criteria (3 CCR sections 6448.3 and 6452). In February 2024, the Tehama County Agricultural Commissioner requested that DPR approve an exemption for a nontarpaulin/tree-hole fumigation method used by Nutrien, Ltd. in several counties.

### **Regulatory Standards and Considerations**

3 CCR sections 6448.3(a) and 6452(c) specify the following criteria for DPR to evaluate new 1,3-D fumigation methods:

- The fumigation method has scientific data and information sufficient to estimate 1,3-D emissions;
- The results are valid as indicated by the quality control data; and
- The conditions studied represent agricultural fields fumigated.

As with the other 1,3-D fumigation methods specified in the regulations, DPR has sufficient data to estimate emissions using the HYDRUS computer model and available soil characteristics data for agricultural fields. Brown (2022) describes this methodology and data, and they meet the criteria specified above.

3 CCR section 6448.3(b) also requires DPR to estimate potential 1,3-D air concentrations using the emission data to:

- determine the combinations of setback distance, application rate, and application block size that will result in a 1,3-D air concentration of no more than 55 parts per billion as a 72-hour time-weighted average;
- assign a field fumigation method code.

While Tehama County is not within any of the ozone NAAs specified by the regulations, DPR has evaluated the VOC emissions so that this fumigation method can be used in other counties. 3 CCR section 6452 sets different standards by which to evaluate whether a new fumigation method will be allowed; one for the Sacramento Metro and South Coast ozone NAAs, and one for the San Joaquin Valley, Southeast Desert, and Ventura ozone NAAs. Sacramento Metro and South Coast NAAs have a less stringent standard because no further VOC reductions from pesticides are needed in these ozone NAAs. Both “low-emission” and “high-emission” methods can be used in these two areas. Only “low-emission” methods are allowed in the San Joaquin Valley, Southeast Desert, and Ventura ozone NAAs during the May–October peak ozone season. The key information is the emission rating (percent of the fumigant applied that is emitted to the air) and the emission rate (emission rating multiplied by the maximum application rate). Either the emission rating or the emission rate can be no greater than the current methods allowed within the ozone NAAs by the regulations. For the health mitigation regulation, DPR estimated both short-term and long-term emissions using the HYDRUS computer model and updated the VOC emission ratings for all 1,3-D fumigation methods (Brown, 2022). Table 1 shows the VOC standard for approval of an interim method for 1,3-D, based on DPR's current emission estimates.

Table 1. VOC standard for approval of an interim method for 1,3-D.

Ozone Nonattainment Area	Maximum Allowed 1,3-D Emission Rating (percentage)	Maximum Allowed 1,3-D Emission Rate (pounds/acre)*
Sacramento Metro, South Coast	52	173
San Joaquin Valley, Southeast Desert, Ventura	35	116

\*Emission rating multiplied by maximum allowed application rate of 332 lbs/ac.

Due to a court order, DPR must also temporarily assign application factors (AFs) to a new 1,3-D fumigation method for township cap purposes.<sup>1</sup> AFs are specified in Appendix J of DPR’s Pesticide Use Enforcement Program Standards Compendium Volume 3, Restricted Materials and Permitting.

While not required for this interim approval, DPR consulted with the agencies specified by Food and Agricultural Code section 14024 for the development of mitigation measures for toxic air contaminants on June 17, 2024.

**Summary and Evaluation of the Submitted Information**

Using HYDRUS, Table 2 shows the emissions DPR has estimated for this tree-hole fumigation method and how it compares to the totally impermeable film (TIF) broadcast field fumigation method (FFM 1242), the current method that represents the group with the lowest emissions (Brown, 2024).

Table 2. Comparison of emissions for the nontarpaulin/tree-hole method vs. TIF/broadcast method (1242).

Emissions	Nontarpaulin/ Tree-Hole Method	TIF Broadcast Method (FFM 1242)
Peak 72-hr emissions with 100 lbs/ac application rate	1.49 µg/m <sup>2</sup> -sec	2.00 µg/m <sup>2</sup> -sec
Total emissions for 21 days as percent of amount applied (VOC emission rating)	10%	11%

DPR uses the peak 72-hr emissions to determine the setback and other health mitigation measures that will achieve the 55 ppb regulatory target concentration. DPR uses the emission rating to estimate the VOC emissions. The emission estimates for the nontarpaulin/tree-hole method are lower than other untarped fumigation methods because labels specify an injection depth of at least 36 inches.

*Evaluation of health mitigation measures* – Application rates for nontarpaulin/tree-hole applications are specified by labels on a per-hole basis. The Telone II label specifies a rate of 24 fl oz (1.85 lb) per hole. On an area basis, this would equate to 1.85 lb/100 ft<sup>2</sup>, or 804 lbs/ac, far higher than the maximum broadcast rate of

332 lb/ac. However, actual per-acre rates are likely to be far lower, with spacing of 10 to 20 feet between tree holes. The following assumptions are used to determine the setback requirements and other restrictions based on the number of tree holes that can be fumigated with 72-hr emissions equivalent to FFM 1242 and a

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<sup>1</sup> DPR limits the 1,3-D used annually in a township (township cap) to a fixed maximum number of adjusted total pounds (ATP). ATP is the total quantity of 1,3-D active ingredient applied during an application, adjusted by an Application Factor (AF). The AF is a numerical value, set by DPR, of the relative amount of 1,3-D potentially present in the air near treated fields based on geographic location, month, and application method. The township cap is administered by the 1,3-D registrant under a Memorandum of Understanding with DPR, and enforced by CACs with conditions for restricted materials permits. A court order requires DPR to temporarily maintain, as an interim measure to address potential cancer risks to bystanders from the use of 1,3-D, the annual township cap of a maximum of 136,000 ATP until additional formal rulemaking is complete.

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maximum application rate of 332 lbs/ac:

- Tree-hole application rate: 2.0 lbs active ingredient/hole (accounts for possible variation between labels)
- Number of tree holes equivalent to 332 lbs/ac: 166 holes/ac ( $332 \text{ lbs/ac} \div 2.0 \text{ lbs/hole}$ )
- Tree-hole area application rate: 871 lbs/ac (assuming each tree hole fumigates 100 ft<sup>2</sup>)
- Tree-hole area application rate resulting in same 72-hr emissions as FFM 1242: 446 lbs/ac ( $332 \text{ lbs/ac} \times 2.00 \text{ } \mu\text{g/m}^2\text{-sec} \div 1.49 \text{ } \mu\text{g/m}^2\text{-sec}$ )
- Number of tree holes equivalent to 446 lbs/ac: 223 holes/ac ( $446 \text{ lbs/ac} \div 2 \text{ lbs/hole}$ ; equivalent to 14.9 holes x 14.9 holes per ac)
- Dimensions of 1 ac (square): 209 ft x 209 ft
- Tree hole spacing equivalent to 446 lbs/ac: 15.0 ft between holes ( $209 \text{ ft} \div (14.9 - 1 \text{ holes})$ )

*Evaluation of VOC emissions* – Comparison of the emission rating thresholds in Table 1 to the emission rating in Table 2 indicates that this nontarpaulin/tree-hole fumigation method should be designated as low-emission and can be used statewide, including all of the NAAs during May-October.

*Evaluation of AFs for the township cap* – The total emissions for the nontarpaulin/tree-hole fumigation method are slightly less than FFM 1242 (Table 2). Therefore, the same AFs can be assigned (Luo and Brown, 2022):

- Inland fumigations during Nov/Jan/Feb: 0.46
- Inland fumigations during Mar-Oct: 0.21
- Coastal fumigations during Nov/Jan/Feb: 0.37
- Inland fumigations during Mar-Oct: 0.24

Note: Labels recommend fumigation during the fall and planting during the spring to prevent phytotoxicity.

## Findings

The 1,3-D nontarpaulin/tree-hole fumigation method requested by the Tehama CAC and Nutrien, Ltd. meets the criteria specified by 3 CCR sections 6448.3 and 6452 and can be allowed statewide on an interim basis, with restrictions.

## Conclusions

Based on the evaluation above, CACs may allow this nontarpaulin/tree-hole fumigation method statewide with the current requirements and the following additional restrictions:

- The application rate cannot exceed 2 lbs of 1,3-D active ingredient per hole, or maximum allowed by label, whichever is less.
- The number of tree holes fumigated during a calendar year must not exceed 166 holes in any acre.
- The spacing between tree holes must be at least 15 ft.
- Since the 72-hr emissions are equivalent to FFM 1242, the setback requirements specified in the “1,3-Dichloropropene Field Fumigation Requirements, est. January 1, 2024,” Table 6, apply. The setback to occupied structures for each tree hole fumigated is 100 feet for seven days. Consistent with the other fumigation methods included in Table 6, these tree-hole fumigations are exempted from the overlapping applications requirements.
- If two or more adjacent tree holes need to be fumigated as a group and the spacing is less than 15 ft, at least 24 hrs must elapse from the end of the fumigation of one tree hole to the start of fumigation of the adjacent tree hole.
- The label recommendation for preparation of the site must be followed by backhoeing to break up restrictive soil layers that may retard fumigant movement. The backhoe site must be dug in the dimensions of at least 10 x 10 x 10 feet. The hole must then be backfilled.
- Soil moisture must be at least 50% of field capacity at three to nine inches below the surface, after backfilling.
- 1,3-D must be applied using a closed-system application tube(s). Nitrogen must be used to purge the

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system before application tube is lifted out of the ground at any time. After the application tube(s) are removed, the soil must be rolled or compacted to close the channel(s) created by the application tube(s).

- Pesticide use reports must identify this nontarpaulin/tree-hole fumigation method using FFM code 1230.
- Due to labeling restrictions, this method cannot be used with products containing a combination of 1,3-D and chloropicrin.
- This nontarpaulin/tree-hole fumigation method is low-emission for VOC purposes with an emission rating of 10%.
- AF for Inland fumigations during Nov/Jan/Feb is 0.46
- AF for Inland fumigations during Mar–Oct is 0.21
- AF for Coastal fumigations during Nov/Jan/Feb is 0.37
- AF for Inland fumigations during Mar–Oct is 0.24
- Tree-hole fumigations during December are prohibited, same as all other 1,3-D fumigations.

To allow sufficient time to make the necessary changes to the township cap tracking and pesticide use reporting systems, DPR grants interim statewide approval of the use of this nontarpaulin/tree-hole fumigation method, with the restrictions outlined above for three years from the effective date of September 3, 2024. If DPR wants to maintain this method beyond the three-year time period, DPR must adopt regulations to include this new method prior to the expiration of the interim approval.

By: \_\_\_\_\_



Date: August 27, 2024

Julie Henderson, Director  
Department of Pesticide Regulation

### References

Brown, Colin. 2022. "[Updates to HYDRUS-simulated flux estimates of 1,3-Dichloropropene maximum period-averaged flux and emission ratios,](#)" Department of Pesticide Regulation Report, September 22, 2022., [PDF](#)

Brown, Colin. 2024. "Simulated flux estimates from tree-hole applications of 1,3-dichloropropene," Department of Pesticide Regulation memorandum to Maziar Kandelous, June 26, 2024.

Luo, Yuzhou and Colin Brown. 2022. "Modeling for application factors of 1,3-Dichloropropene, modeling approach #2," Department of Pesticide Regulation Report, September 12, 2022