



# REGULATIONS AROUND THE USE OF 1,3-DICHLOROPROPENE

DPR's Air Program



# AGENDA

- Overview and Introduction
- Requirements introduced in the regulations
- Soil moisture determination and hands-on training

# OVERVIEW AND INTRODUCTION

- 1,3-D is designated as a California restricted material (3 CCR section 6400)
- County agricultural commissioners (CACs) have the authority to require more restrictive use requirements based on local conditions in accordance with 3 CCR section 6432.

# OVERVIEW AND INTRODUCTION

- Current requirements focus on mitigating cancer risk to non-occupational bystanders.
- Since 1990s, the “township cap” program has controlled cancer risk
- The lawsuit (Vasquez vs. DPR) successfully challenged the township cap program as an underground regulation.
- On November 7, 2022, DPR submitted a notice of proposed regulatory action to the Office of Administrative Law pursuant to the court order.
- This regulation will continue and improve DPR’s management of the potential health risks from 1,3-D

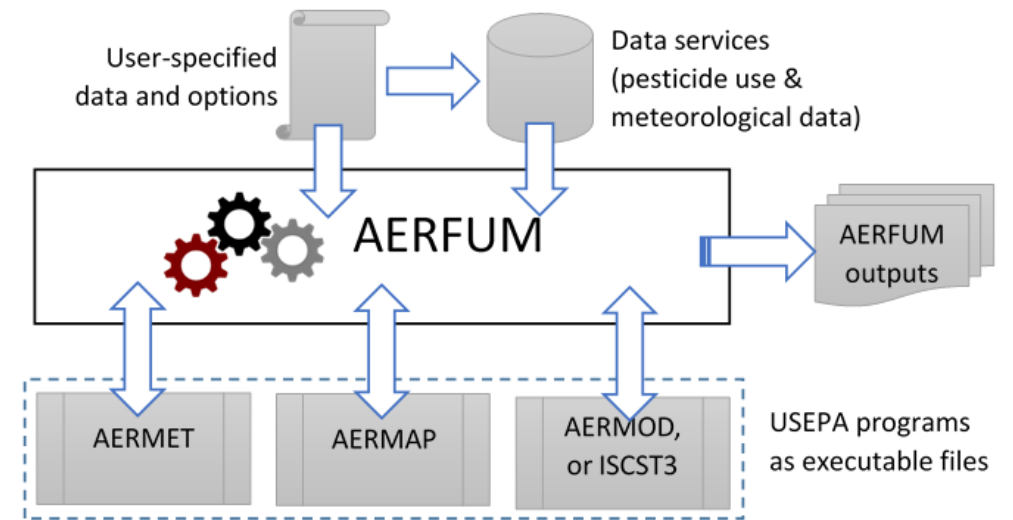
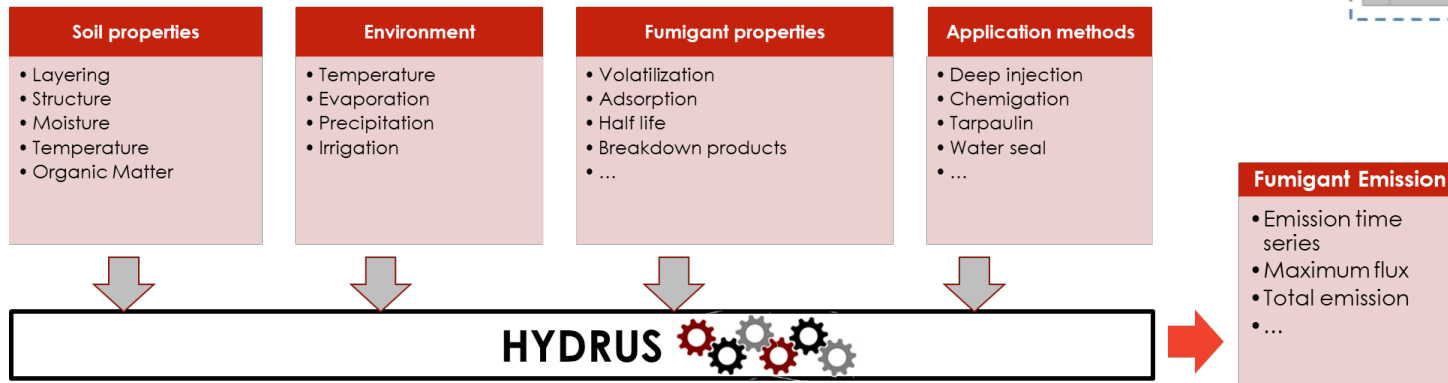
# OVERVIEW AND INTRODUCTION

- This regulation will mitigate both cancer risk and acute risk, as well as reduce volatile organic compound (VOC) emissions to reduce air pollution
- Mitigate acute risk (based on the 2021 risk management directive)
  - Target population: non-occupational bystanders (infants, children)
  - Primary mitigation measures: setbacks and fumigation method restrictions
- Mitigate cancer risk (based on the 2016 risk management directive)
  - Target population: non-occupational bystanders (infants, children)
  - Primary mitigation measure: setbacks & fumigation method restrictions replace township cap

# MODELING TOOLS

State-of-the-art model for water, dissolved material, heat, and gas movement in the soil

- Validated by multiple field studies and for different application methods of 1,3-D
- Applicable for all fumigants and application methods



AERFUM was developed by DPR as an air dispersion modeling system and uses USEPA's AERMOD as the simulation engine

# OVERVIEW OF THE REGULATION

- 3 CCR:
  - 6448. 1,3-Dichloropropene Field Fumigation – General Requirements.
  - 6448.1. Approved Totally Impermeable Film (TIF) Tarpaulins for 1,3-Dichloropropene
  - 6448.2. 1,3-Dichloropropene Field Fumigation Methods
  - 6448.4. Annual 1,3-Dichloropropene Report
  - 6624. Pesticide Use Records
  - 6626. Pesticide Use Reports for Production Agriculture

# GENERAL REQUIREMENTS

## 3 CCR 6448

- 6448
  - (a) Production of an agricultural commodity
  - (b) Setback distance
  - (c) Overlapping setbacks
  - (d) Maximum application rate (broadcast equivalent)
  - (e) Maximum application size
  - (f) Notice of intent



# GENERAL REQUIREMENTS

## 3 CCR 6448

- 6448
  - (a) 1,3-Dichloropropene shall only be used for the production of an agricultural commodity.
  - (d) Maximum application rate (broadcast equivalent) is 332 lbs/ac, but there are limitations imposed by season, region, and application method.
  - (e) Maximum application size is 80 acres, but there are limitations imposed by season, region, and application method.
  - (f) The notice of intent must be submitted to the commissioner at least 48 hours prior to commencing fumigation.

# SETBACK 3 CCR 6448(b)

- 6448(b)
  - What is a setback (vs. buffer zone)
  - How to measure a setback
  - Example of setbacks for an application site



# SETBACK

## 3 CCR 6448(b)

- 3 CCR section 6448(b) prohibits 1,3-D field soil fumigations within the setback distance from occupied structures, including residences, onsite employee housing, schools, convalescent homes, hospitals, businesses, or other similar sites identified by the CAC.
- Non-residential agricultural buildings, including barns, livestock facilities, sheds, and outhouses, **are not** by default considered to be an occupied structure.

# SETBACK

3 CCR 6448(b)

- A setback is also required for any other indoor or outdoor site that will be occupied for at least 72 consecutive hours during and following a 1,3-Dichloropropene application.
- The setback distance from an occupied structure or other site varies with the fumigation method, region, season, application rate ( broadcast-equivalent), and application block size

# SETBACK

## OCCUPIED STRUCTURE

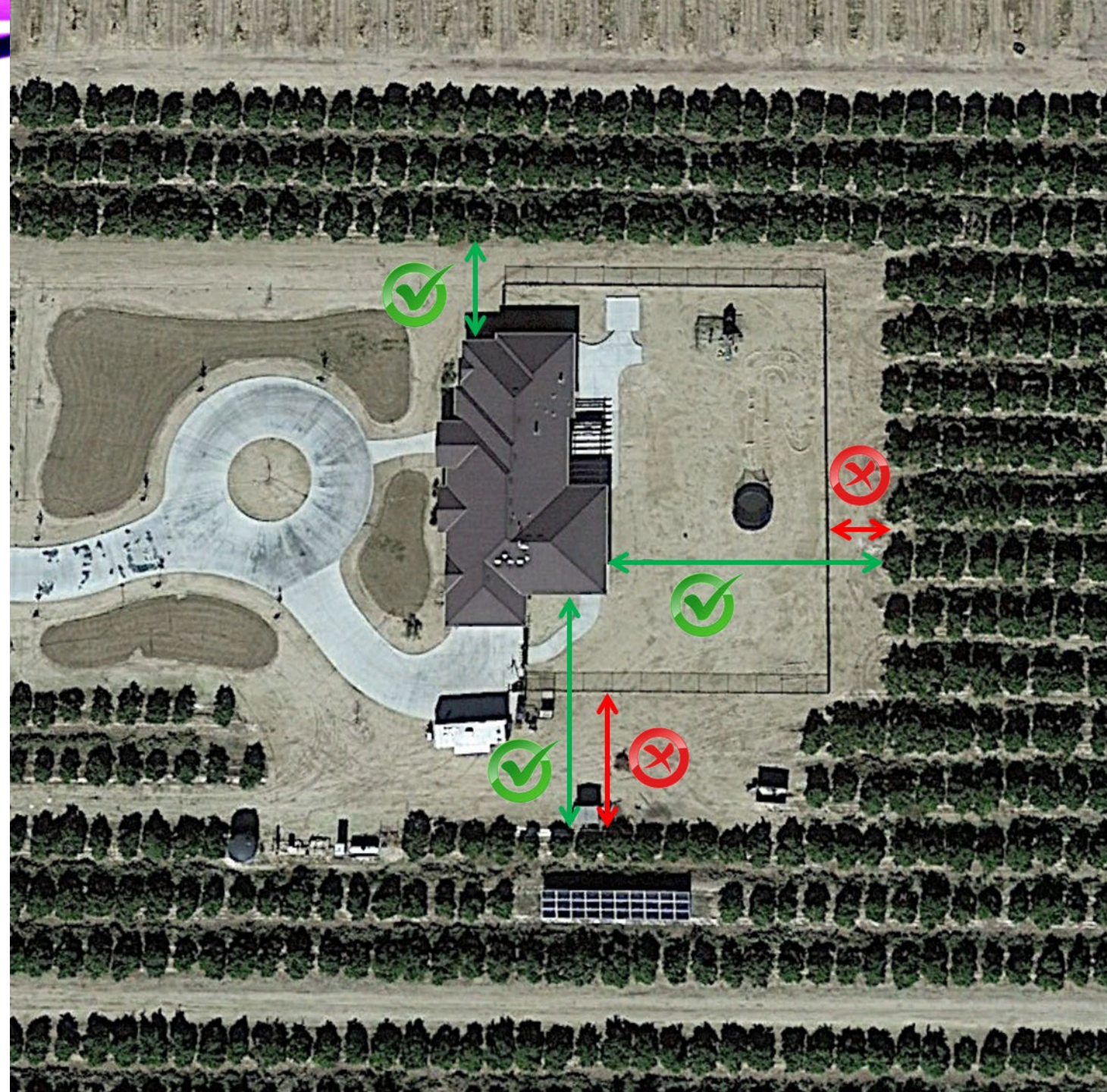
### 3 CCR 6448(b)(1)

- An application of 1,3-Dichloropropene is prohibited within the setback distance from any structure outside of the property to be treated, unless the operators of the other properties provide written agreement to the certified applicator prior to the application that the structures will be voluntarily vacated **during the application and for at least the seven consecutive day period after the application is complete**. The certified applicator shall provide a copy of the written agreements to the commissioner with each notice of intent.

# WHAT IS SETBACK

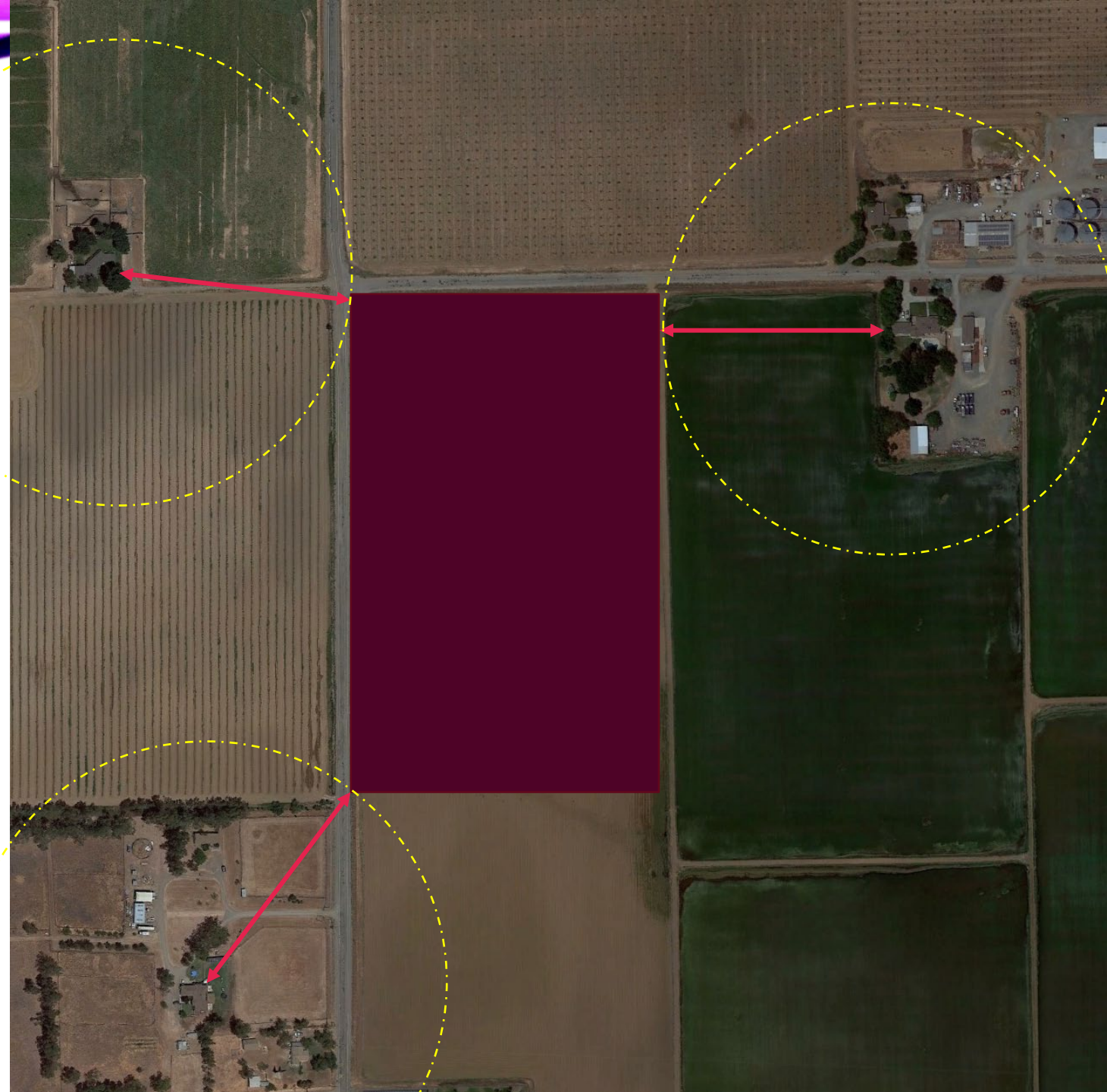
3 CCR 6448(b)

- It is the distance between an occupied structure and the edge of the application site.
- The setback is measured from the wall of the structure, not lawns or other outdoor areas associated with a structure.



# DRAWING SETBACK

- The minimum setback distance for any application is **100 ft.**
- The setback duration is **seven** days ( after the application is complete)
- The easiest way is to draw a circle with the structure in the center



# SETBACK VS. BUFFER ZONE

- Setback surrounds the structure while buffer zone surrounds the application area
- Occupancy/activity limitation applies to structures when a setback is required; however, it is applied to the entire zone/area when a buffer zone is required.





# SETBACK TABLES

## 1,3-DICHLOROPROPENE FIELD FUMIGATION REQUIREMENTS (1,3-D FFR) – SECTION 3

### What does NA mean?

It means the combination of application rate and setback distance is not allowed

240 lbs/ac	NA	1 ac	3 ac
250 lbs/ac	NA	1 ac	2 ac
260 lbs/ac	NA	1 ac	2 ac
270 lbs/ac	NA	1 ac	2 ac
280 lbs/ac	NA	NA	2 ac
290 lbs/ac	NA	NA	2 ac
300 lbs/ac	NA	NA	2 ac
310 lbs/ac	NA	NA	1 ac
320 lbs/ac	NA	NA	1 ac
332 lbs/ac	NA	NA	1 ac

Broadcast Equivalent a.i. App Rate	Occupied Structure Setback Distance				
	100 ft	200 ft	300 ft	400 ft	500 ft
80 lbs/ac	25 ac	35 ac	55 ac	75 ac	80 ac
90 lbs/ac	15 ac	30 ac	40 ac	55 ac	65 ac
100 lbs/ac	15 ac	20 ac	30 ac	40 ac	55 ac
110 lbs/ac	10 ac	15 ac	25 ac	35 ac	40 ac
120 lbs/ac	10 ac	10 ac	20 ac	30 ac	35 ac
130 lbs/ac	5 ac	10 ac	15 ac	25 ac	30 ac
140 lbs/ac	5 ac	10 ac	15 ac	20 ac	25 ac
150 lbs/ac	5 ac	5 ac	10 ac	15 ac	20 ac
160 lbs/ac	5 ac	5 ac	10 ac	15 ac	20 ac
170 lbs/ac	4 ac	5 ac	10 ac	10 ac	15 ac
180 lbs/ac	4 ac	5 ac	5 ac	10 ac	15 ac
190 lbs/ac	4 ac	5 ac	5 ac	10 ac	10 ac
200 lbs/ac	4 ac	5 ac	5 ac	10 ac	10 ac
210 lbs/ac	3 ac	4 ac	5 ac	5 ac	10 ac
220 lbs/ac	3 ac	4 ac	5 ac	5 ac	10 ac
230 lbs/ac	3 ac	4 ac	5 ac	5 ac	5 ac
240 lbs/ac	3 ac	4 ac	5 ac	5 ac	5 ac
250 lbs/ac	3 ac	4 ac	4 ac	5 ac	5 ac
260 lbs/ac	2 ac	3 ac	4 ac	5 ac	5 ac
270 lbs/ac	2 ac	3 ac	4 ac	5 ac	5 ac
280 lbs/ac	2 ac	3 ac	4 ac	5 ac	5 ac
290 lbs/ac	2 ac	3 ac	4 ac	4 ac	5 ac
300 lbs/ac	2 ac	3 ac	4 ac	4 ac	5 ac
310 lbs/ac	2 ac	3 ac	4 ac	4 ac	5 ac
320 lbs/ac	1 ac	3 ac	3 ac	4 ac	5 ac
332 lbs/ac	1 ac	2 ac	3 ac	4 ac	5 ac

to application rate.

Occupied Structure Setback Distance			
200 ft	300 ft	400 ft	500 ft
75 ac	80 ac	---*	---
50 ac	80 ac	---	---
40 ac	60 ac	80 ac	---
30 ac	45 ac	65 ac	80 ac
25 ac	40 ac	55 ac	70 ac
20 ac	30 ac	45 ac	60 ac
15 ac	25 ac	35 ac	50 ac

### What does “---” mean?

indicates that the occupied structure distance is not applicable because a shorter distance is sufficient for a maximum application block of 80 ac

# SEASONAL RESTRICTION

## 3 CCR 6448(b)

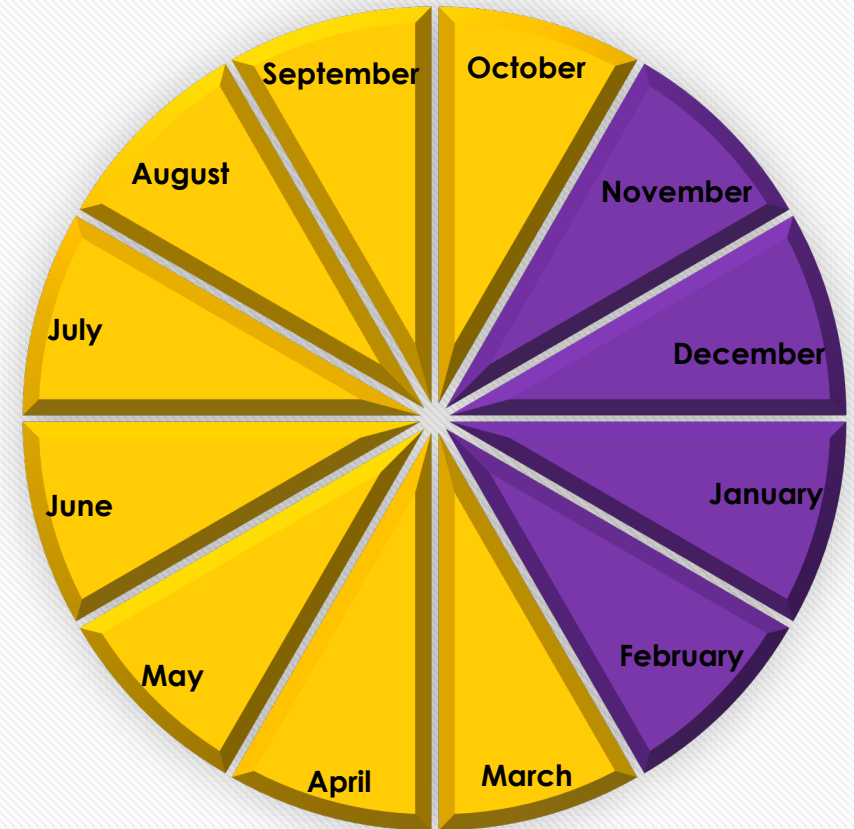
Due to different weather conditions, setback requirements for the winter season differ from non-winter season. In general, setback requirements for winter season are more stringent than those for non-winter.

**Non-Winter  
Season**

Total of 8 months  
from March  
through October

**Winter  
Season**

Total of 4 months  
from November  
through February



# REGIONAL RESTRICTIONS

## 3 CCR 6448(b) & 1,3-D FFR – PAGE 4



- Due to different weather conditions, setback requirements for Inland counties differ from Coastal counties. In general, setback requirements for Coastal counties are more stringent than those for Inland counties.
- **Inland Counties:** Alameda, Amador, Alpine, Butte, Calaveras, Colusa, Contra Costa, El Dorado, Fresno, Glenn, Imperial, Inyo, Kern, Kings, Lake, Lassen, Madera, Mariposa, Merced, Modoc, Mono, Napa, Nevada, Placer, Plumas, Riverside, Sacramento, San Benito, San Bernardino, San Joaquin, Santa Clara, Shasta, Sierra, Siskiyou, Solano, Stanislaus, Sutter, Tehama, Trinity, Tulare, Tuolumne, Yolo, Yuba
- **Coastal Counties:** Del Norte, Humboldt, Los Angeles, Marin, Mendocino, Monterey, Orange, San Diego, San Francisco, San Luis Obispo, San Mateo, Santa Barbara, Santa Cruz, Sonoma, Ventura

# SETBACK TABLE EXAMPLE

## 1,3-D FFR – SECTION 3

FFM 1224, 1225, 1226, or 1227

Scenario #1: 250 lbs/ac and 200 ft Setback

Scenario #2: 250 lbs/ac and 40 ac field

Scenario #1: 15 acres

Scenario #2: 500 ft

40 acres

200 ft

20 acres

400 ft

80 acres

100 ft

### Winter Season Coastal County

Broadcast Equivalent a.i. App Rate	Occupied Structure Setback Distance				
	100 ft	200 ft	300 ft	400 ft	500 ft
80 lbs/ac	80 ac	---	---	---	---
90 lbs/ac	80 ac	---	---	---	---
100 lbs/ac	80 ac	---	---	---	---
110 lbs/ac	80 ac	---	---	---	---
120 lbs/ac	75 ac	80 ac	---	---	---
130 lbs/ac	55 ac	80 ac	---	---	---
140 lbs/ac	45 ac	70 ac	80 ac	---	---
150 lbs/ac	35 ac	55 ac	80 ac	---	---
160 lbs/ac	30 ac	45 ac	70 ac	80 ac	---
170 lbs/ac	25 ac	40 ac	60 ac	80 ac	---
180 lbs/ac	20 ac	35 ac	50 ac	65 ac	80 ac
190 lbs/ac	20 ac	30 ac	45 ac	60 ac	75 ac
200 lbs/ac	15 ac	25 ac	40 ac	50 ac	65 ac
210 lbs/ac	15 ac	25 ac	35 ac	45 ac	60 ac
220 lbs/ac	10 ac	20 ac	30 ac	40 ac	50 ac
230 lbs/ac	10 ac	20 ac	30 ac	35 ac	45 ac
240 lbs/ac	10 ac	15 ac	25 ac	35 ac	40 ac
250 lbs/ac	10 ac	15 ac	20 ac	30 ac	40 ac
260 lbs/ac	10 ac	15 ac	20 ac	30 ac	35 ac
270 lbs/ac	5 ac	10 ac	20 ac	25 ac	35 ac
280 lbs/ac	5 ac	10 ac	15 ac	25 ac	30 ac
290 lbs/ac	5 ac	10 ac	15 ac	20 ac	30 ac
300 lbs/ac	5 ac	10 ac	15 ac	20 ac	25 ac
310 lbs/ac	5 ac	10 ac	15 ac	20 ac	25 ac
320 lbs/ac	5 ac	5 ac	10 ac	15 ac	25 ac
332 lbs/ac	5 ac	5 ac	10 ac	15 ac	20 ac

### Non-winter Season Coastal County

Broadcast Equivalent a.i. App Rate	Occupied Structure Setback Distance				
	100 ft	200 ft	300 ft	400 ft	500 ft
80 lbs/ac	80 ac	---	---	---	---
90 lbs/ac	80 ac	---	---	---	---
100 lbs/ac	80 ac	---	---	---	---
110 lbs/ac	80 ac	---	---	---	---
120 lbs/ac	80 ac	---	---	---	---
130 lbs/ac	80 ac	---	---	---	---
140 lbs/ac	80 ac	---	---	---	---
150 lbs/ac	80 ac	---	---	---	---
160 lbs/ac	80 ac	---	---	---	---
170 lbs/ac	80 ac	---	---	---	---
180 lbs/ac	70 ac	80 ac	---	---	---
190 lbs/ac	60 ac	80 ac	---	---	---
200 lbs/ac	50 ac	80 ac	---	---	---
210 lbs/ac	45 ac	70 ac	80 ac	---	---
220 lbs/ac	35 ac	60 ac	80 ac	---	---
230 lbs/ac	35 ac	50 ac	75 ac	80 ac	---
240 lbs/ac	30 ac	45 ac	70 ac	80 ac	---
250 lbs/ac	25 ac	40 ac	60 ac	80 ac	---
260 lbs/ac	25 ac	35 ac	55 ac	70 ac	80 ac
270 lbs/ac	20 ac	35 ac	50 ac	65 ac	80 ac
280 lbs/ac	20 ac	30 ac	45 ac	60 ac	75 ac
290 lbs/ac	15 ac	30 ac	40 ac	55 ac	65 ac
300 lbs/ac	15 ac	25 ac	35 ac	50 ac	60 ac
310 lbs/ac	15 ac	25 ac	35 ac	45 ac	55 ac
320 lbs/ac	10 ac	20 ac	30 ac	40 ac	55 ac
332 lbs/ac	10 ac	20 ac	30 ac	40 ac	50 ac

### Winter Season Inland County

Broadcast Equivalent a.i. App Rate	Occupied Structure Setback Distance				
	100 ft	200 ft	300 ft	400 ft	500 ft
80 lbs/ac	80 ac	---	---	---	---
90 lbs/ac	80 ac	---	---	---	---
100 lbs/ac	80 ac	---	---	---	---
110 lbs/ac	80 ac	---	---	---	---
120 lbs/ac	80 ac	---	---	---	---
130 lbs/ac	80 ac	---	---	---	---
140 lbs/ac	80 ac	---	---	---	---
150 lbs/ac	65 ac	80 ac	---	---	---
160 lbs/ac	50 ac	75 ac	80 ac	---	---
170 lbs/ac	40 ac	60 ac	80 ac	---	---
180 lbs/ac	35 ac	55 ac	75 ac	80 ac	---
190 lbs/ac	30 ac	45 ac	65 ac	80 ac	---
200 lbs/ac	25 ac	40 ac	55 ac	75 ac	80 ac
210 lbs/ac	20 ac	35 ac	50 ac	65 ac	75 ac
220 lbs/ac	20 ac	30 ac	45 ac	60 ac	70 ac
230 lbs/ac	15 ac	25 ac	40 ac	55 ac	60 ac
240 lbs/ac	15 ac	25 ac	35 ac	45 ac	55 ac
250 lbs/ac	15 ac	20 ac	30 ac	40 ac	55 ac
260 lbs/ac	10 ac	20 ac	30 ac	40 ac	50 ac
270 lbs/ac	10 ac	15 ac	25 ac	35 ac	45 ac
280 lbs/ac	10 ac	15 ac	25 ac	35 ac	40 ac
290 lbs/ac	5 ac	15 ac	20 ac	30 ac	40 ac
300 lbs/ac	5 ac	15 ac	20 ac	30 ac	35 ac
310 lbs/ac	5 ac	10 ac	20 ac	25 ac	35 ac
320 lbs/ac	5 ac	10 ac	15 ac	25 ac	35 ac
332 lbs/ac	5 ac	10 ac	15 ac	20 ac	30 ac

### Non-winter Season Inland County

Broadcast Equivalent a.i. App Rate	Occupied Structure Setback Distance				
	100 ft	200 ft	300 ft	400 ft	500 ft
80 lbs/ac	80 ac	---	---	---	---
90 lbs/ac	80 ac	---	---	---	---
100 lbs/ac	80 ac	---	---	---	---
110 lbs/ac	80 ac	---	---	---	---
120 lbs/ac	80 ac	---	---	---	---
130 lbs/ac	80 ac	---	---	---	---
140 lbs/ac	80 ac	---	---	---	---
150 lbs/ac	80 ac	---	---	---	---
160 lbs/ac	80 ac	---	---	---	---
170 lbs/ac	80 ac	---	---	---	---
180 lbs/ac	80 ac	---	---	---	---
190 lbs/ac	80 ac	---	---	---	---
200 lbs/ac	80 ac	---	---	---	---
210 lbs/ac	80 ac	---	---	---	---
220 lbs/ac	80 ac	---	---	---	---
230 lbs/ac	70 ac	80 ac	---	---	---
240 lbs/ac	60 ac	80 ac	---	---	---
250 lbs/ac	55 ac	80 ac	80 ac	---	---
260 lbs/ac	45 ac	80 ac	80 ac	---	---
270 lbs/ac	40 ac	70 ac	80 ac	---	---
280 lbs/ac	35 ac	60 ac	80 ac	---	---
290 lbs/ac	35 ac	55 ac	80 ac	---	---
300 lbs/ac	30 ac	50 ac	75 ac	80 ac	---
310 lbs/ac	25 ac	45 ac	70 ac	80 ac	---
320 lbs/ac	25 ac	40 ac	65 ac	80 ac	---
332 lbs/ac	20 ac	40 ac	55 ac	75 ac	80 ac



## 1,3-dichloropropene Field Fumigation Requirements

☏ ☒ ...

County

Del Norte

El Dorado

Fresno

Glenn

Humboldt

FFM Code

1211

1224

1225

1226

1227

Applic. Rate (lb/ac)

290

300

310

320

332

Application Date

March to October

November to February

County	Field Fumigation Method (FFM)	FFM Code	Application Date	Application Rate (lb/ac)	Field Size (ac)	Setback Distance (ft)
Fresno	Nontarpaulin/24 inches deep/broadcast	1224	March to October	332	20 ac	100
Fresno	Nontarpaulin/24 inches deep/broadcast	1224	March to October	332	40 ac	200
Fresno	Nontarpaulin/24 inches deep/broadcast	1224	March to October	332	55 ac	300
Fresno	Nontarpaulin/24 inches deep/broadcast	1224	March to October	332	75 ac	400
Fresno	Nontarpaulin/24 inches deep/broadcast	1224	March to October	332	80 ac	500

Three hyphens (---) indicate that the occupied structure distance is not applicable because a shorter distance is sufficient for a maximum application block of 80 ac.

# HANDS-ON TRAINING FOR SETBACK CALCULATOR

# HANDS-ON TRAINING FOR SETBACK CALCULATOR

Select the application method

Select the application rate

Select your county

Select your application time

dpr 1,3-dichloropropene Field Fumigation Requirements

County ...  
 Mariposa  
 Mendocino  
 Merced  
 Modoc  
 Mono

FFM Code  
 1224  
 1225  
 1226  
 1227

Applic. Rate (lb/ac)  
 290  
 300  
 310  
 320  
 332

Application Date  
 March to October  
 November to February

County	Field Fumigation Method (FFM)	FFM Code	Application Date	Application Rate (lb/ac)	Field Size (ac)	Setback Distance (ft)
Merced	Nontarpaulin/24 inches deep/broadcast	1224	March to October	332	20 ac	100
Merced	Nontarpaulin/24 inches deep/broadcast	1224	March to October	332	40 ac	200
Merced	Nontarpaulin/24 inches deep/broadcast	1224	March to October	332	55 ac	300
Merced	Nontarpaulin/24 inches deep/broadcast	1224	March to October	332	75 ac	400
Merced	Nontarpaulin/24 inches deep/broadcast	1224	March to October	332	80 ac	500

Three hyphens (---) indicate that the occupied structure distance is not applicable because a shorter distance is sufficient for a maximum application block of 80 ac.

The table will give you all possible application sizes and associated setback distances

# HANDS-ON TRAINING FOR SETBACK CALCULATOR



## 1,3-dichloropropene Field Fumigation Requirements

**County:**  
Merced ( Inland)

**FFM:**  
1224 (24" broadcast)

**Application rate:**  
332 lbs/ac

**Application season:**  
March – October  
(Non-winter)

County

Mariposa

Mendocino

Merced

Modoc

Mono

FFM Code

1211

1224

1225

1226

1227

1228

Applic. Rate (lb/ac)

290

300

310

320

332

Application Date

March to October

November to February

County	Field Fumigation Method (FFM)	FFM Code	Application Date	Application Rate (lb/ac)	Field Size (ac)	Setback Distance (ft)
Merced	Nontarpaulin/24 inches deep/broadcast	1224	March to October	332	20 ac	100
Merced	Nontarpaulin/24 inches deep/broadcast	1224	March to October	332	40 ac	200
Merced	Nontarpaulin/24 inches deep/broadcast	1224	March to October	332	55 ac	300
Merced	Nontarpaulin/24 inches deep/broadcast	1224	March to October	332	75 ac	400
Merced	Nontarpaulin/24 inches deep/broadcast	1224	March to October	332	80 ac	500

Three hyphens (---) indicate that the occupied structure distance is not applicable because a shorter distance is sufficient for a maximum application block of 80 ac.

# HANDS-ON TRAINING FOR SETBACK CALCULATOR

## dpr 1,3-dichloropropene Field Fumigation Requirements

**County:**  
Monterey ( Coastal)

**FFM:**  
1224 (24" broadcast)

**Application rate:**  
332 lbs/ac

**Application season:**  
March – October  
(Non-winter)

County

- Modoc
- Mono
- Monterey
- Napa
- Nevada

FFM Code

- 1211
- 1224
- 1225
- 1226
- 1227
- 

Applic. Rate (lb/ac)

- 290
- 300
- 310
- 320
- 332

Application Date

- March to October
- November to February

County	Field Fumigation Method (FFM)	FFM Code	Application Date	Application Rate (lb/ac)	Field Size (ac)	Setback Distance (ft)
Monterey	Nontarpaulin/24 inches deep/broadcast	1224	March to October	332	10 ac	100
Monterey	Nontarpaulin/24 inches deep/broadcast	1224	March to October	332	20 ac	200
Monterey	Nontarpaulin/24 inches deep/broadcast	1224	March to October	332	30 ac	300
Monterey	Nontarpaulin/24 inches deep/broadcast	1224	March to October	332	40 ac	400
Monterey	Nontarpaulin/24 inches deep/broadcast	1224	March to October	332	50 ac	500

Three hyphens (---) indicate that the occupied structure distance is not applicable because a shorter distance is sufficient for a maximum application block of 80 ac.



# HANDS-ON TRAINING FOR SETBACK CALCULATOR



## 1,3-dichloropropene Field Fumigation Requirements

**County:**  
Merced ( Inland)

**FFM:**  
1224 (24" broadcast)

**Application rate:**  
332 lbs/ac

**Application season:**  
March – October  
(Non-winter)

County

Mariposa

Mendocino

Merced

Modoc

Mono

FFM Code

1211

1224

1225

1226

1227

1228

Applic. Rate (lb/ac)

290

300

310

320

332

Application Date

March to October

November to February

County	Field Fumigation Method (FFM)	FFM Code	Application Date	Application Rate (lb/ac)	Field Size (ac)	Setback Distance (ft)
Merced	Nontarpaulin/24 inches deep/broadcast	1224	March to October	332	20 ac	100
Merced	Nontarpaulin/24 inches deep/broadcast	1224	March to October	332	40 ac	200
Merced	Nontarpaulin/24 inches deep/broadcast	1224	March to October	332	55 ac	300
Merced	Nontarpaulin/24 inches deep/broadcast	1224	March to October	332	75 ac	400
Merced	Nontarpaulin/24 inches deep/broadcast	1224	March to October	332	80 ac	500

Three hyphens (---) indicate that the occupied structure distance is not applicable because a shorter distance is sufficient for a maximum application block of 80 ac.

# HANDS-ON TRAINING FOR SETBACK CALCULATOR

## dpr 1,3-dichloropropene Field Fumigation Requirements

**County:**  
Merced ( Inland)

**FFM:**  
1206 (18" broadcast)

**Application rate:**  
332 lbs/ac

**Application season:**  
March – October  
(Non-winter)

County

Mariposa

Mendocino

Merced

Modoc

Mono

FFM Code

1204

1205

1206

1207

1208

1209

Applic. Rate (lb/ac)

290

300

310

320

332

Application Date

March to October

November to February

County	Field Fumigation Method (FFM)	FFM Code	Application Date	Application Rate (lb/ac)	Field Size (ac)	Setback Distance (ft)
Merced	Nontarpaulin/18 inches deep/broadcast or bed	1206	March to October	332	04 ac	100
Merced	Nontarpaulin/18 inches deep/broadcast or bed	1206	March to October	332	05 ac	200
Merced	Nontarpaulin/18 inches deep/broadcast or bed	1206	March to October	332	10 ac	300
Merced	Nontarpaulin/18 inches deep/broadcast or bed	1206	March to October	332	15 ac	400
Merced	Nontarpaulin/18 inches deep/broadcast or bed	1206	March to October	332	20 ac	500

Three hyphens (---) indicate that the occupied structure distance is not applicable because a shorter distance is sufficient for a maximum application block of 80 ac.

# HANDS-ON TRAINING FOR SETBACK CALCULATOR



## 1,3-dichloropropene Field Fumigation Requirements

**County:**  
Merced ( Inland)

**FFM:**  
1224 (24" broadcast)

**Application rate:**  
332 lbs/ac

**Application season:**  
March – October  
(Non-winter)

County

Mariposa

Mendocino

Merced

Modoc

Mono

FFM Code

1211

1224

1225

1226

1227

1228

Applic. Rate (lb/ac)

290

300

310

320

332

Application Date

March to October

November to February

County	Field Fumigation Method (FFM)	FFM Code	Application Date	Application Rate (lb/ac)	Field Size (ac)	Setback Distance (ft)
Merced	Nontarpaulin/24 inches deep/broadcast	1224	March to October	332	20 ac	100
Merced	Nontarpaulin/24 inches deep/broadcast	1224	March to October	332	40 ac	200
Merced	Nontarpaulin/24 inches deep/broadcast	1224	March to October	332	55 ac	300
Merced	Nontarpaulin/24 inches deep/broadcast	1224	March to October	332	75 ac	400
Merced	Nontarpaulin/24 inches deep/broadcast	1224	March to October	332	80 ac	500

Three hyphens (---) indicate that the occupied structure distance is not applicable because a shorter distance is sufficient for a maximum application block of 80 ac.

# HANDS-ON TRAINING FOR SETBACK CALCULATOR

## dpr 1,3-dichloropropene Field Fumigation Requirements

**County:**  
Merced ( Inland)

**FFM:**  
1224 (24" broadcast)

**Application rate:**  
170 lbs/ac

**Application season:**  
March – October  
(Non-winter)

County

Merced

Mariposa

Mendocino

Merced

Modoc

Mono

FFM Code

1211

1224

1225

1226

1227

Applic. Rate (lb/ac)

150

160

170

180

190

Application Date

March to October

November to February

County	Field Fumigation Method (FFM)	FFM Code	Application Date	Application Rate (lb/ac)	Field Size (ac)	Setback Distance (ft)
Merced	Nontarpaulin/24 inches deep/broadcast	1224	March to October	170	80 ac	100
Merced	Nontarpaulin/24 inches deep/broadcast	1224	March to October	170	---	200
Merced	Nontarpaulin/24 inches deep/broadcast	1224	March to October	170	---	300
Merced	Nontarpaulin/24 inches deep/broadcast	1224	March to October	170	---	400
Merced	Nontarpaulin/24 inches deep/broadcast	1224	March to October	170	---	500

Three hyphens (---) indicate that the occupied structure distance is not applicable because a shorter distance is sufficient for a maximum application block of 80 ac.

# HANDS-ON TRAINING FOR SETBACK CALCULATOR



## 1,3-dichloropropene Field Fumigation Requirements

**County:**  
Merced ( Inland)

**FFM:**  
1224 (24" broadcast)

**Application rate:**  
332 lbs/ac

**Application season:**  
March – October  
(Non-winter)

County

- Mariposa
- Mendocino
- Merced
- Modoc
- Mono

FFM Code

- 1211
- 1224
- 1225
- 1226
- 1227
- 1228

Applic. Rate (lb/ac)

- 290
- 300
- 310
- 320
- 332

Application Date

- March to October
- November to February

County	Field Fumigation Method (FFM)	FFM Code	Application Date	Application Rate (lb/ac)	Field Size (ac)	Setback Distance (ft)
Merced	Nontarpaulin/24 inches deep/broadcast	1224	March to October	332	20 ac	100
Merced	Nontarpaulin/24 inches deep/broadcast	1224	March to October	332	40 ac	200
Merced	Nontarpaulin/24 inches deep/broadcast	1224	March to October	332	55 ac	300
Merced	Nontarpaulin/24 inches deep/broadcast	1224	March to October	332	75 ac	400
Merced	Nontarpaulin/24 inches deep/broadcast	1224	March to October	332	80 ac	500

Three hyphens (---) indicate that the occupied structure distance is not applicable because a shorter distance is sufficient for a maximum application block of 80 ac.

# HANDS-ON TRAINING FOR SETBACK CALCULATOR

## dpr 1,3-dichloropropene Field Fumigation Requirements

**County:**  
Merced ( Inland)

**FFM:**  
1224 (24" broadcast)

**Application rate:**  
332 lbs/ac

**Application season:**  
November to February (Winter)

County

.....  
 Mariposa  
 Mendocino  
 Merced  
 Modoc  
 Mono

FFM Code

1211  
 1224  
 1225  
 1226  
 1227  
 ---

Applic. Rate (lb/ac)

290  
 300  
 310  
 320  
 332

Application Date

March to October  
 November to February

County	Field Fumigation Method (FFM)	FFM Code	Application Date	Application Rate (lb/ac)	Field Size (ac)	Setback Distance (ft)
Merced	Nontarpaulin/24 inches deep/broadcast	1224	November to February	332	05 ac	100
Merced	Nontarpaulin/24 inches deep/broadcast	1224	November to February	332	10 ac	200
Merced	Nontarpaulin/24 inches deep/broadcast	1224	November to February	332	15 ac	300
Merced	Nontarpaulin/24 inches deep/broadcast	1224	November to February	332	20 ac	400
Merced	Nontarpaulin/24 inches deep/broadcast	1224	November to February	332	30 ac	500

Three hyphens (---) indicate that the occupied structure distance is not applicable because a shorter distance is sufficient for a maximum application block of 80 ac.

# HANDS-ON TRAINING FOR SETBACK CALCULATOR



## 1,3-dichloropropene Field Fumigation Requirements

**County:**  
Merced ( Inland)

**FFM:**  
1224 (24" broadcast)

**Application rate:**  
332 lbs/ac

**Application season:**  
March – October  
(Non-winter)

County

Mariposa

Mendocino

Merced

Modoc

Mono

FFM Code

1211

1224

1225

1226

1227

1228

Applic. Rate (lb/ac)

290

300

310

320

332

Application Date

March to October

November to February

County	Field Fumigation Method (FFM)	FFM Code	Application Date	Application Rate (lb/ac)	Field Size (ac)	Setback Distance (ft)
Merced	Nontarpaulin/24 inches deep/broadcast	1224	March to October	332	20 ac	100
Merced	Nontarpaulin/24 inches deep/broadcast	1224	March to October	332	40 ac	200
Merced	Nontarpaulin/24 inches deep/broadcast	1224	March to October	332	55 ac	300
Merced	Nontarpaulin/24 inches deep/broadcast	1224	March to October	332	75 ac	400
Merced	Nontarpaulin/24 inches deep/broadcast	1224	March to October	332	80 ac	500

Three hyphens (---) indicate that the occupied structure distance is not applicable because a shorter distance is sufficient for a maximum application block of 80 ac.

# HANDS-ON TRAINING FOR SETBACK CALCULATOR

## dpr 1,3-dichloropropene Field Fumigation Requirements

**County:**  
Monterey ( Coastal)

**FFM:**  
1206 (18" broadcast)

**Application rate:**  
170 lbs/ac

**Application season:**  
November to February (Winter)

County

Modoc

Mono

Monterey

Napa

Nevada

FFM Code

1204

1205

1206

1207

1208

1209

Applic. Rate (lb/ac)

150

160

170

180

190

Application Date

March to October

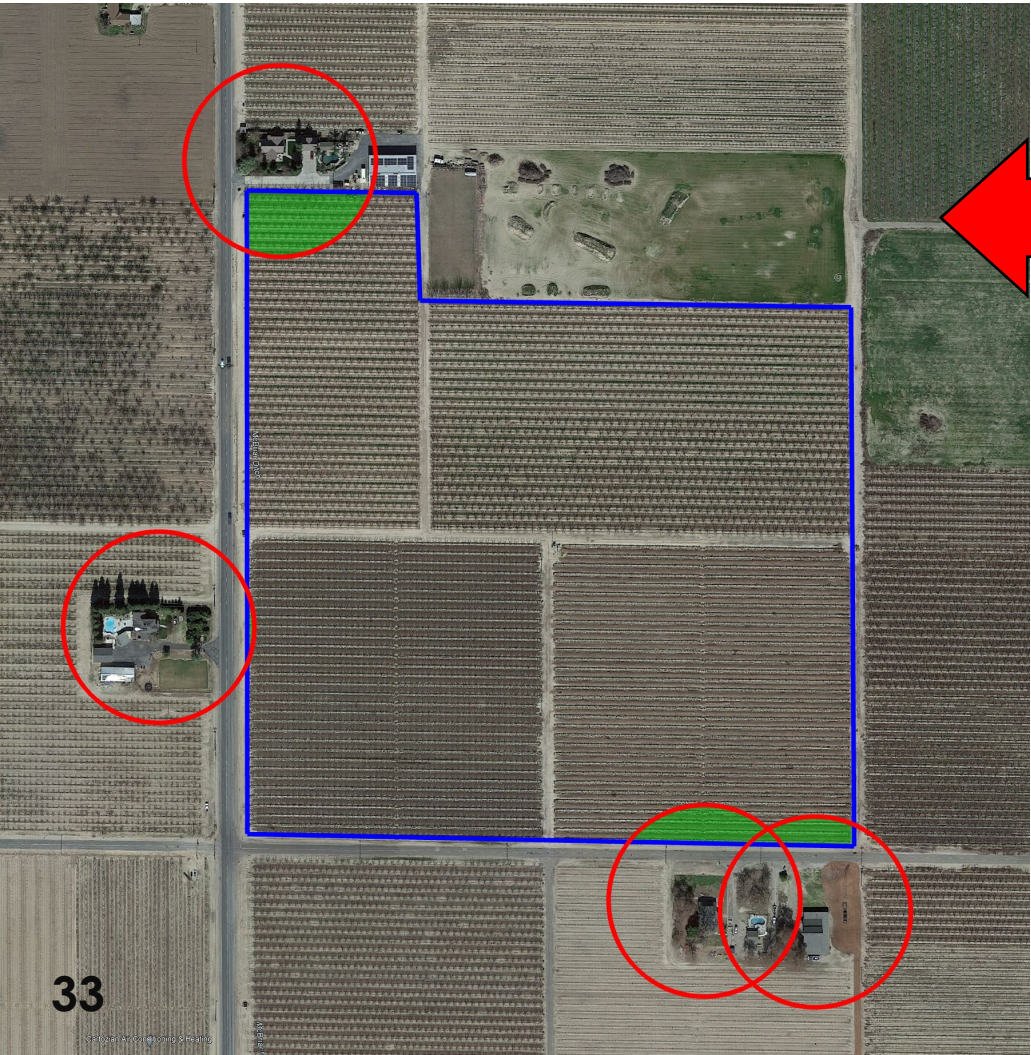
November to February

County	Field Fumigation Method (FFM)	FFM Code	Application Date	Application Rate (lb/ac)	Field Size (ac)	Setback Distance (ft)
Monterey	Nontarpaulin/18 inches deep/broadcast or bed	1206	November to February	170	04 ac	100
Monterey	Nontarpaulin/18 inches deep/broadcast or bed	1206	November to February	170	05 ac	200
Monterey	Nontarpaulin/18 inches deep/broadcast or bed	1206	November to February	170	10 ac	300
Monterey	Nontarpaulin/18 inches deep/broadcast or bed	1206	November to February	170	10 ac	400
Monterey	Nontarpaulin/18 inches deep/broadcast or bed	1206	November to February	170	15 ac	500

Three hyphens (---) indicate that the occupied structure distance is not applicable because a shorter distance is sufficient for a maximum application block of 80 ac.

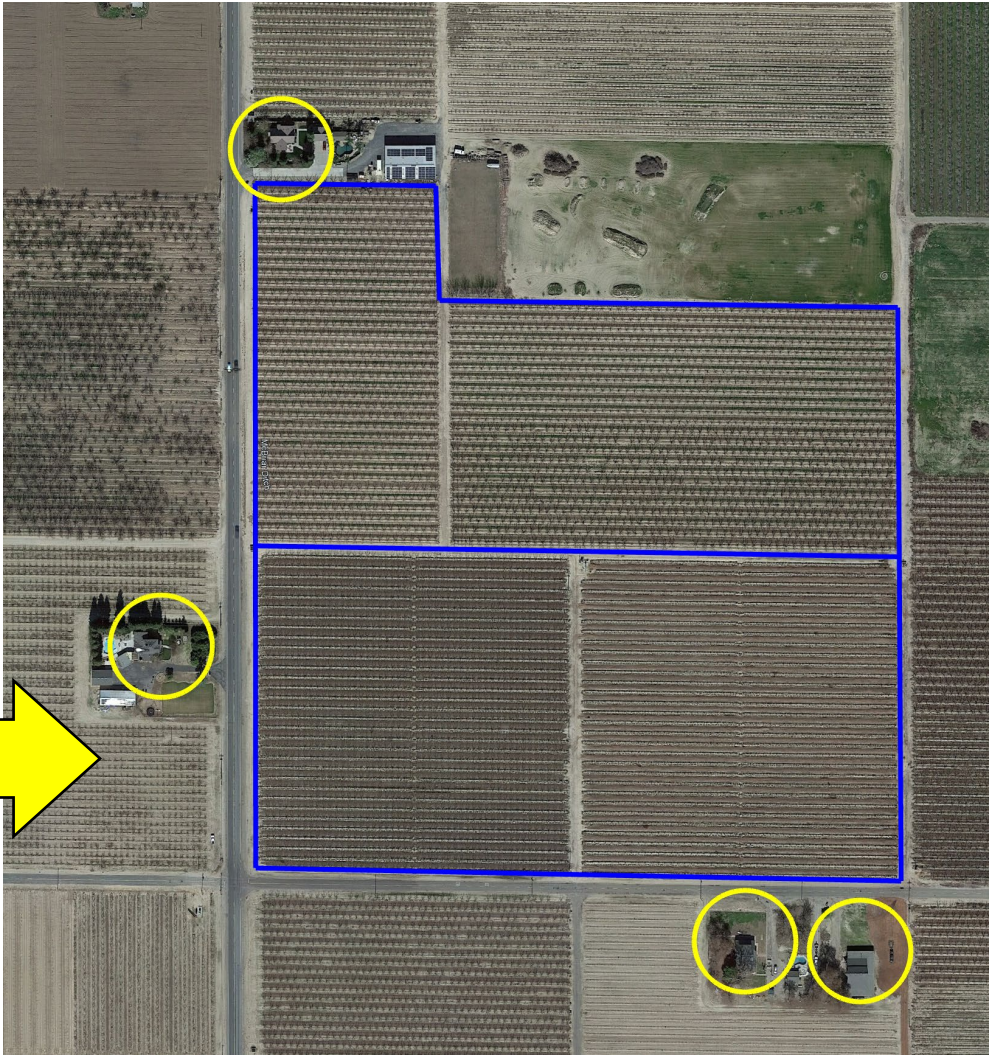


# SETBACK EXAMPLE



<b>Size</b>	32 ac
<b>Method</b>	1224
<b>Rate</b>	332
<b>Setback (ft)</b>	200 ft

<b>Size</b>	≤ 20ac
<b>Method</b>	1224
<b>Rate</b>	332
<b>Setback (ft)</b>	100 ft



# OVERLAPPING SITES

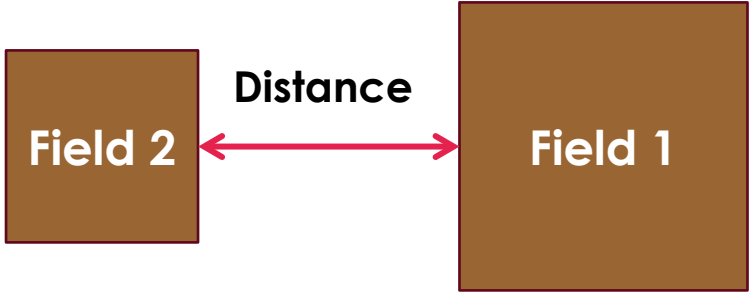
## 3 CCR 6448(c)

**Overlapping application sites:**

If the setbacks for two or more application blocks overlap within 36 hours from the time the earlier field soil fumigation is complete until the start of the later field soil fumigation, the overlapping setback criteria must be followed.

There is no overlapping setback requirement/criteria if both applications are TIF tarp applications.

	Field 1	Field 2		
<b>Setback (ft)</b>	400	200	<b>Distance</b>	<b>Overlap</b>
<b>Scenario 1</b>			500	Yes
<b>Scenario 2</b>			650	No



# OVERLAPPING SITES

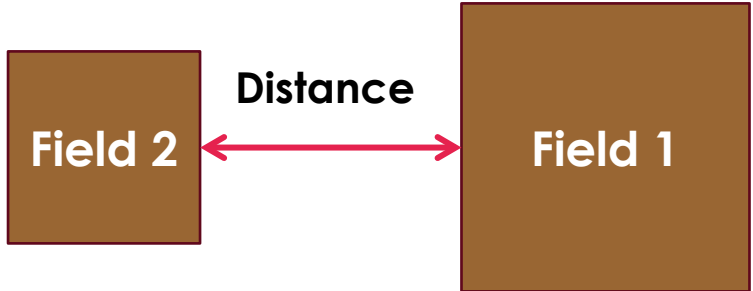
## 3 CCR 6448(c)

### Overlapping application sites:

For overlapping field soil fumigations, the setback from occupied structures is the same distance for all application blocks and is determined using

1. The combined acreage of all overlapping application blocks,
2. The highest application rate and
3. The setback table for the fumigation method with the largest setback.

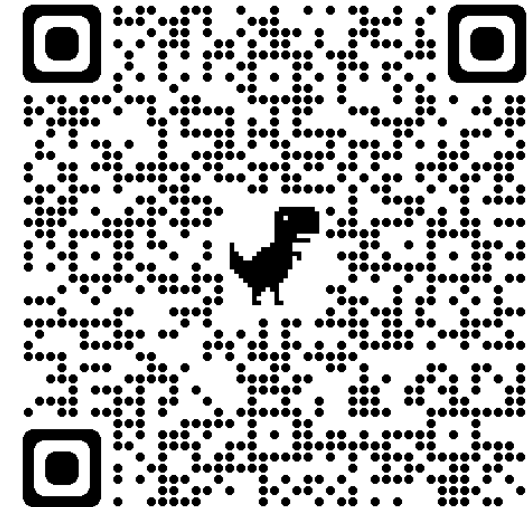
	Field 1	Field 2		
<b>Setback (ft)</b>	400	200	<b>Distance</b>	<b>Overlap</b>
			<b>Scenario 1</b>	500
			<b>Scenario 2</b>	650
				Yes
				No



# TIF TARP REQUIREMENTS

## SECTION 6448.1

- TIF tarps with Mass Transfer Coefficient  $\leq 0.046$  cm/h (1,3-D) are recognized as TIF tarp for 1,3-D fumigation
- DPR maintains a list of TIF tarps that meet permeability and printing requirements
  - **This list is separate from the TIF tarp list for Chloropicrin**
  - Mass Transfer coefficient at RH > 90% should not be more than 0.046 cm/hr
  - The Tarpaulin name and lot number should be printed in a font size equal to 2- 3 inches in height and printed at least 1 foot from each edge and at an interval of no longer than 20-30 feet along the length of the tarpaulin.
  - The printing must be legible, including a printing color that is different from the color of the tarpaulin.



# FUMIGATION METHOD

## SECTION 6448.2

<b>Group of FFM</b> s	<b>FFMs in the group</b>
1-Standard nontarped and non-TIF tarp shallow (12 inch) methods	1201, 1202, 1203, 1204, 1205
2-Standard nontarped and non-TIF tarp deep (18 inch) methods	1206, 1207, 1208, 1210, 1211
3-Chemigation (drip)/non-TIF tarp method	1209
4-24-inch injection methods	1224, 1225, 1226, 1227
5-TIF methods – broadcast and strip	1242, 1247, 1249
6-TIF methods – bed and drip	1243, 1245, 1248, 1259
7-40% TIF with 18-inch injection depth method	1250
8-40% TIF with 24-inch injection depth method	1264

# FUMIGATION METHOD

## SECTION 6448.2

- FFM 1224: It is a non-tarpaulin broadcast application with an injection depth of 24". It is similar to FFM 1206 with a different injection depth ( 24" instead of 18")
- FFM 1225: It is a tarpaulin broadcast application with an injection depth of 24". It is similar to FFM 1207 with a different injection depth ( 24" instead of 18")
- FFM 1226: It is a non-tarpaulin strip application with an injection depth of 24". It is similar to FFM 1210 with a different injection depth ( 24" instead of 18")
- FFM 1227: It is a non-tarpaulin GPS-targeted application with an injection depth of 24". It is similar to FFM 1211 with a different injection depth ( 24" instead of 18")

# FUMIGATION METHOD

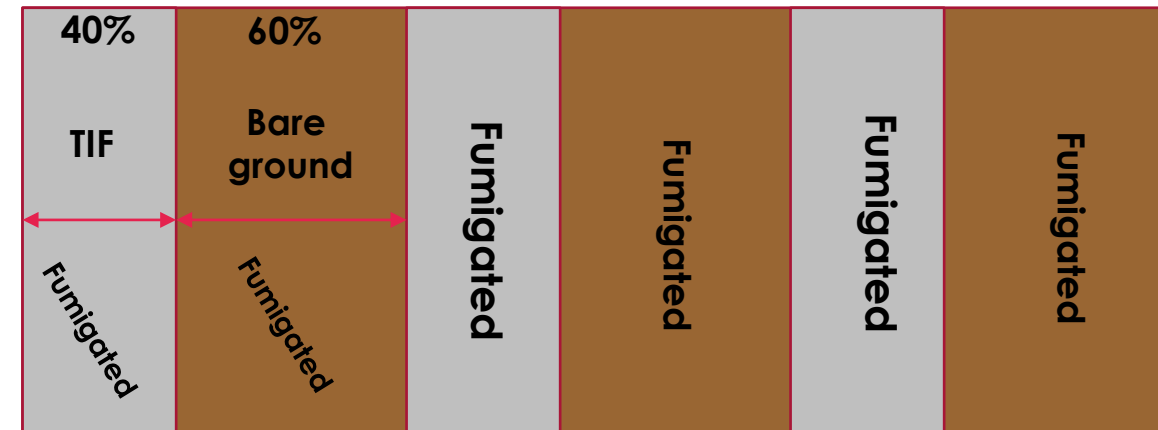
## SECTION 6448.2

- FFM 1250: It is a broadcast application with 40% of each row covered by TIF tarpaulin and with an injection depth of 18".
- FFM 1264: It is a broadcast application with 40% of each row covered by TIF tarpaulin and with an injection depth of 24".
- FFMs 1250 and 1264 are similar except for the application depth ( 18" vs. 24")
- FFM 1250 is different from FFM 1249

**FFM 1249**



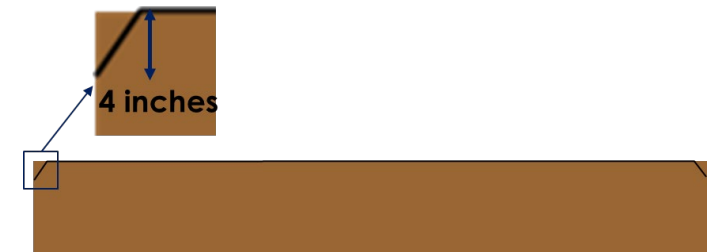
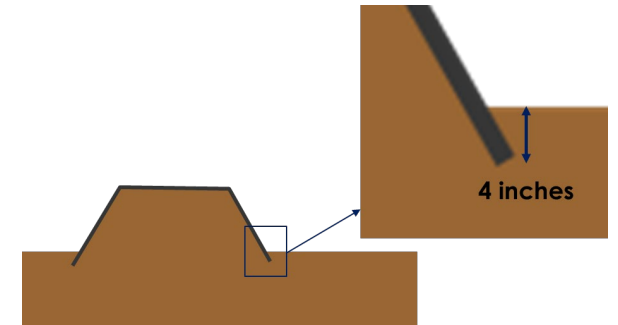
**FFMs 1250 and 1264**



# FUMIGATION METHOD

## SECTION 6448.2(a)

- A field cannot be covered with a mix of TIF and non-TIF tarps.
- Tarpaulins must be buried under at least four inches of firmly packed soil at the end of the rows and each side of the bed ( for Chemigation).
- A tarpaulin plan is required and must be included.
- TIF tarps cut/removed no sooner than 10 days/ 240 hours (It was changed from 9 to 10 days)





# FUMIGATION METHOD

## SECTIONS 6448.2(b) & 6448.2(c)

- Except for drip fumigation, the application block must have a soil moisture of at least 50 percent of field capacity at a depth of 3" to 9" below the surface when the fumigation occurs.
- Applications for tree and grape crops must use an approved fumigation method with
  - an injection point at least 24 inches below the soil surface or
  - a TIF tarpaulin

# FUMIGATION METHODS

## SECTION 6448.2(d)

Conditions	Prohibited methods
San Joaquin Valley, Southeast Desert, and Ventura ozone nonattainment areas during May–October	1201, 1202, 1203, <b>1205</b> , 1206, <b>1209</b> (1206: only if used with Chloropicrin)
Trees and Grapes	All methods from 1201 through 1211
All the time	1290

**Red** font indicates the change from low-VOC to high-VOC

# USE REPORT TO PUR SECTION 6448.2(d)

- DPR is required to draft an annual report of use information for the previous calendar year
  - Use for each township and evaluation of the top 10 townships in different counties
  - Summary of ambient air monitoring data and evaluation of locations with concentrations more than 0.27 ppb for 1-year average or 55 ppb for 24 hours
  - Evaluations include estimated peak 24-hr, peak 72-hr, and avg 1-yr concentrations
  - Determination if additional restrictions are needed
- For this purpose, the regulation requires that:
  - All use reports for 1,3-Dichloropropene must be submitted electronically as specified by the commissioner.
- All PUR data should be submitted through Telus ( formerly Agrian)
  - recommended permit condition

# TOWNSHIP CAP

## APPENDIX J: SECTION J.1

- Mitigate cancer risk (based on the 2016 risk management directive)
  - Setbacks and mitigation method restrictions replace township cap
- The court on the Lawsuit (Vasquez v. DPR) issued a second order requiring DPR to:
  - Propose regulation to mitigate cancer risk to occupational bystanders by March 2024
  - Maintain the current township cap of 136,000 ATP and December prohibition until the occupational bystanders regulation is in effect.

# TOWNSHIP CAP

## APPENDIX J: SECTION J.1

- Until occupational bystanders regulation is complete,( not just proposed):
  - DPR maintains the current township cap of 136,000 Adjusted Total Pound (ATP)
  - No application is allowed during the month of December (December prohibition)
  - Township Cap will continue to be administrated by DOW and Telus ( formerly Agrian)
  - Permit conditions continue to include additional NOI info to verify cap compliance
  - The application factors (AFs) that are used to calculate ATP were revised (Regions, Seasons)

# APPLICATION FACTORS

## APPENDIX J: SECTION J.4

		Inland*	Inland*	Coastal*	Coastal*	VOC emission status
Field Fumigation Method (FFM)	FFM Code	Nov/Jan/Feb	Mar-Oct	Nov/Jan/Feb	Mar-Oct	
Nontarp/shallow/broadcast or bed	1201	2.93	1.40	2.42	1.78	High
Tarp/shallow/broadcast	1202					
Tarp/shallow/bed	1203					
Nontarp/shallow/broadcast or bed/3 water treatments	1204					
Tarp/shallow/bed/3 water treatments	1205					
Chemigation (drip system)/tarp	1209	2.15	1.02	1.74	1.21	High
Nontarp/18 inches deep/broadcast or bed	1206	1.73	0.83	1.42	1.04	High
Tarp/18 inches deep/broadcast	1207					
Tarp/18 inches deep/bed	1208					
Nontarp/18 inches deep/strip	1210					
Nontarp/18 inches deep/GPS targeted	1211					
40% TIF tarp/18 inches deep/broadcast	1250	1.16	0.56	0.95	0.70	Low
Nontarp/24 inches deep/broadcast	1224	1.00	0.48	0.82	0.61	Low
Tarp/24 inches deep/broadcast	1225					
Nontarp/24 inches deep/strip	1226					
Nontarp/24 inches deep/GPS targeted	1227					
TIF tarp/shallow/bed	1243					
TIF tarp/shallow/bed/3 water treatments	1245	0.76	0.36	0.62	0.45	Low
TIF tarp/deep/bed	1248					
Chemigation (drip)/TIF tarp	1259					
40% TIF tarp/24 inches deep/broadcast	1264	0.71	0.34	0.58	0.43	Low
Totally Impermeable Film (TIF) tarp/shallow/broadcast	1242	0.46	0.21	0.37	0.24	Low
TIF tarp/deep/broadcast	1247					
TIF tarp/deep/strip	1249					
Other label method	1290	Prohibited				

# COMBINATION (1,3-D + PIC) PRODUCTS

Requirement	1,3-D Regulations and Permit Conditions	Chloropicrin CA Labeling and Permit Conditions
<b>Fumigation method changes</b>	Added 1224-nontarp/24-in 1225-tarp/24-in 1226-nontarp/24-in/strip 1227-nontarp/24-in/GPS 1250-40% TIF/18-in 1264-40% TIF/24-in  1290-prohibited	Added 1,3-D methods listed allowed but no chloropicrin regulatory changes (e.g., buffer zone for 1224 same as 1206)  1290 already prohibited
<b>Tree and grape fumigation methods</b>	Allowed method at least 24 inches deep or uses TIF tarp	No specific methods required
<b>Tree hole fumigations</b>	Not allowed	Allowed, if label allows
<b>Minimum soil moisture</b>	50% field capacity at 3-9 inches, except drip	50% field capacity at 9 inches for injection, 2-3 inches for drip (U.S. EPA label)
<b>TIF tarp printing</b>	1,3-D and chloropicrin have same requirements: tarp name and lot printed 2-3 inches in height, at least 1 foot from each edge, at an interval of 20-30 feet	
<b>Minimum TIF tarp cutting period</b>	10 days after application	9 days after application
<b>Minimum TIF tarp removal period</b>	None	1 day after cutting
<b>Tarp plan elements</b>	1,3-D and chloropicrin have same requirements: (A) Tarp identification (B) Schedule for checking tarp (C) Responsible parties (D) Minimum damage repaired (E) Factors that trigger tarp repair (F) Method to cut tarp (G) Cutting date (H) Removal date	

# COMBINATION (1,3-D + PIC) PRODUCTS

Requirement	1,3-D Regulations and Permit Conditions	Chloropicrin CA Labeling and Permit Conditions
<b>Emergency preparedness and response measures</b>	None	Monitoring or notification
<b>Emergency response plan</b>	None	CAC notified if implemented
<b>Annual township cap</b>	136,000 adjusted total pounds	None
<b>Setback/buffer zone</b>	Setback	Buffer zone
<b>Location (area affected)</b>	Surrounds occupied structure	Surrounds application block
<b>Restrictions within area affected</b>	Applications prohibited	Only handling and transit allowed
<b>Distance</b>	100 – 500 ft	25 – 2640 ft
<b>Duration</b>	7 days (168 hrs)	48 hrs
<b>Seasons</b>	Mar-Oct, Nov/Jan/Feb, Dec prohibited	None
<b>Regions</b>	1,3-D and chloropicrin have same Coastal and Inland designations	
<b>Max application block</b>	80 ac	40 ac, TIF 60 ac
<b>Max application rate (broadcast equivalent)</b>	332 lbs/ac (1,3-D)	350 lbs/ac (chloropic)
<b>Application time restrictions</b>	None	1 hr after sunrise and 3 hrs prior to sunset, except TIF
<b>Overlapping application criteria</b>	2 or more applications separated by combined setback distance and less than 36 hrs, max 80 ac combined	2 or more applications separated by combined buffer distance and less than 36 hrs, max 40-60 ac combined
<b>NOI time and information</b>	48 hours, start time, vacating agreements, township cap info	48 hours, start time
<b>Approved TIF tarps</b>	1,3-D and chloropicrin have same list ( except one TIF tarp)	



# SOIL MOISTURE REQUIREMENT

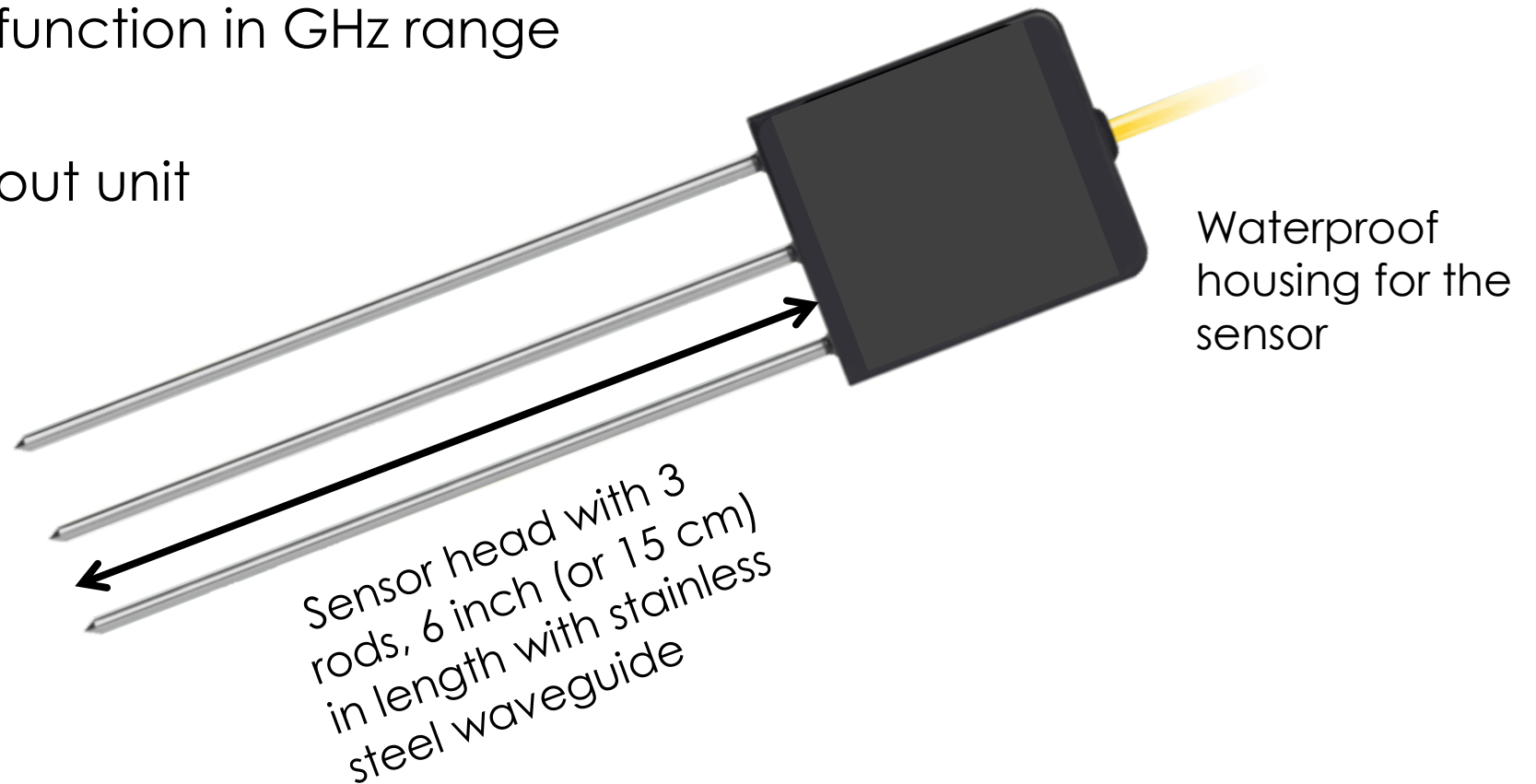
- Soil moisture must be at least 50% of field capacity (FC)
  - A change from the current requirement of between 25% and 50% FC
  - It applies to all methods (FFMs) except 1209,1259
- There are three distinct options to comply with this requirement
  1. Irrigate with three inches of water 48–72 hours prior to fumigation, **OR**
  2. Determine the soil moisture content using the “Feel and Appearance Method”, **OR**
  3. Determine the soil moisture content using a “Soil Moisture Sensor”

# SOIL MOISTURE REQUIREMENT

- Soil moisture sensor
  - Criteria
  - How to use it
- Bucket experiment
  - How to assemble
  - How to conduct
- Feel and appearance method

# SOIL MOISTURE SENSOR

- Operation based on a Time Domain Reflectometry (TDR) function in GHz range
- Easy and quick readout unit

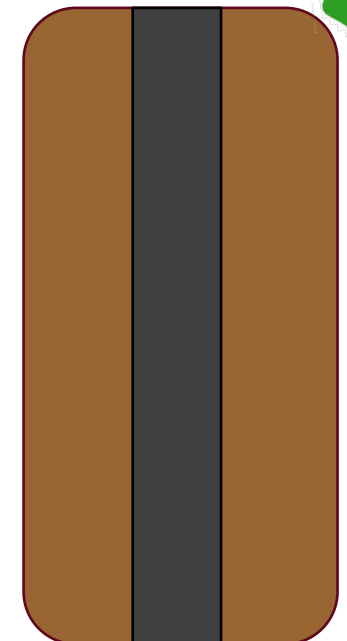
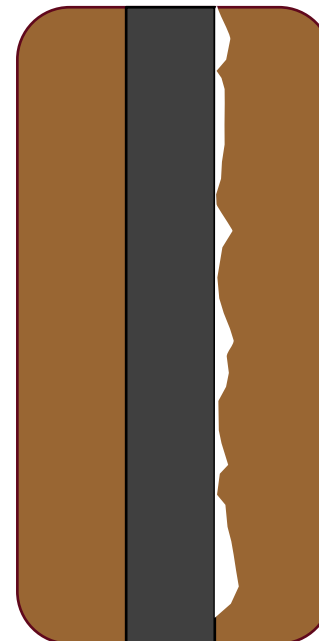
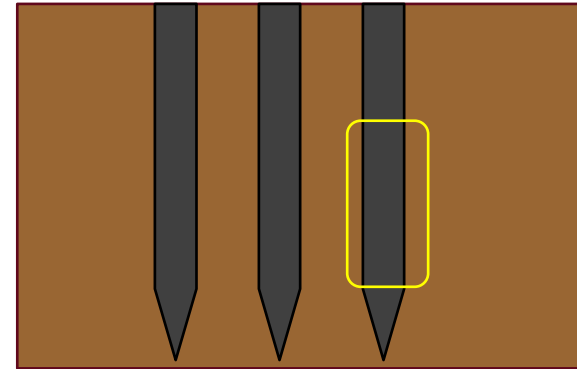


# SOIL MOISTURE SENSOR

- Measurement range: 0 to 100 % VWC
- Measurement resolution: 0.1 % VWC
- Measurement accuracy:
  - $\pm 1$  percentage VWC points in coarse and medium texture soils;
  - $\pm 2.5$  percentage VWC points in fine-textured soils.

# HOW TO USE IT

- Use a shovel or any other tool to remove the top 3" soil layer
- Avoid areas with rocks, wood/branches, and plant residues ( they affect your reading)
- Insert the soil firmly into the soil ( the entire 15 cm rod must go into the soil)
- Keep you hand still as shaking may results in air-gap between the rod and soil ( it affects your reading)



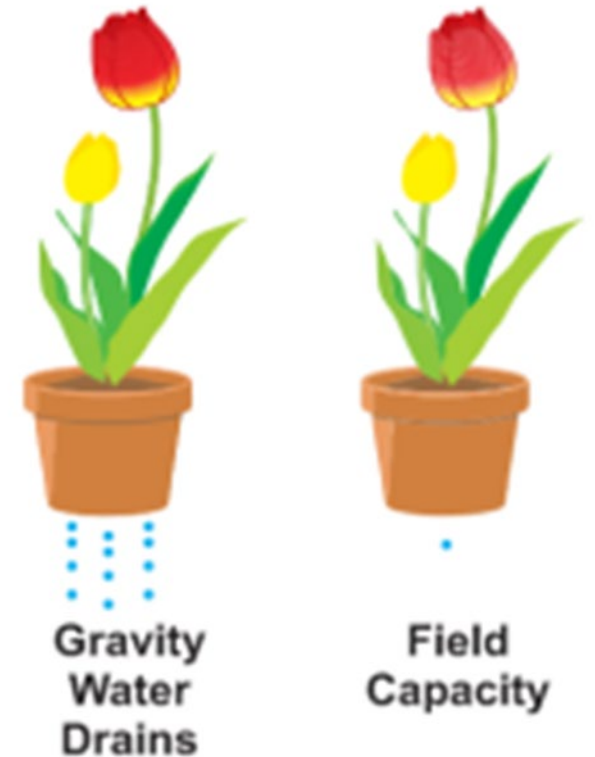
# HOW TO USE IT

- Follow the manual. Each sensor should have a user manual
- DPR purchased 10 units that will be placed in Regional Offices as a loaner
- Next, we will have hands-on training on how to use this kit



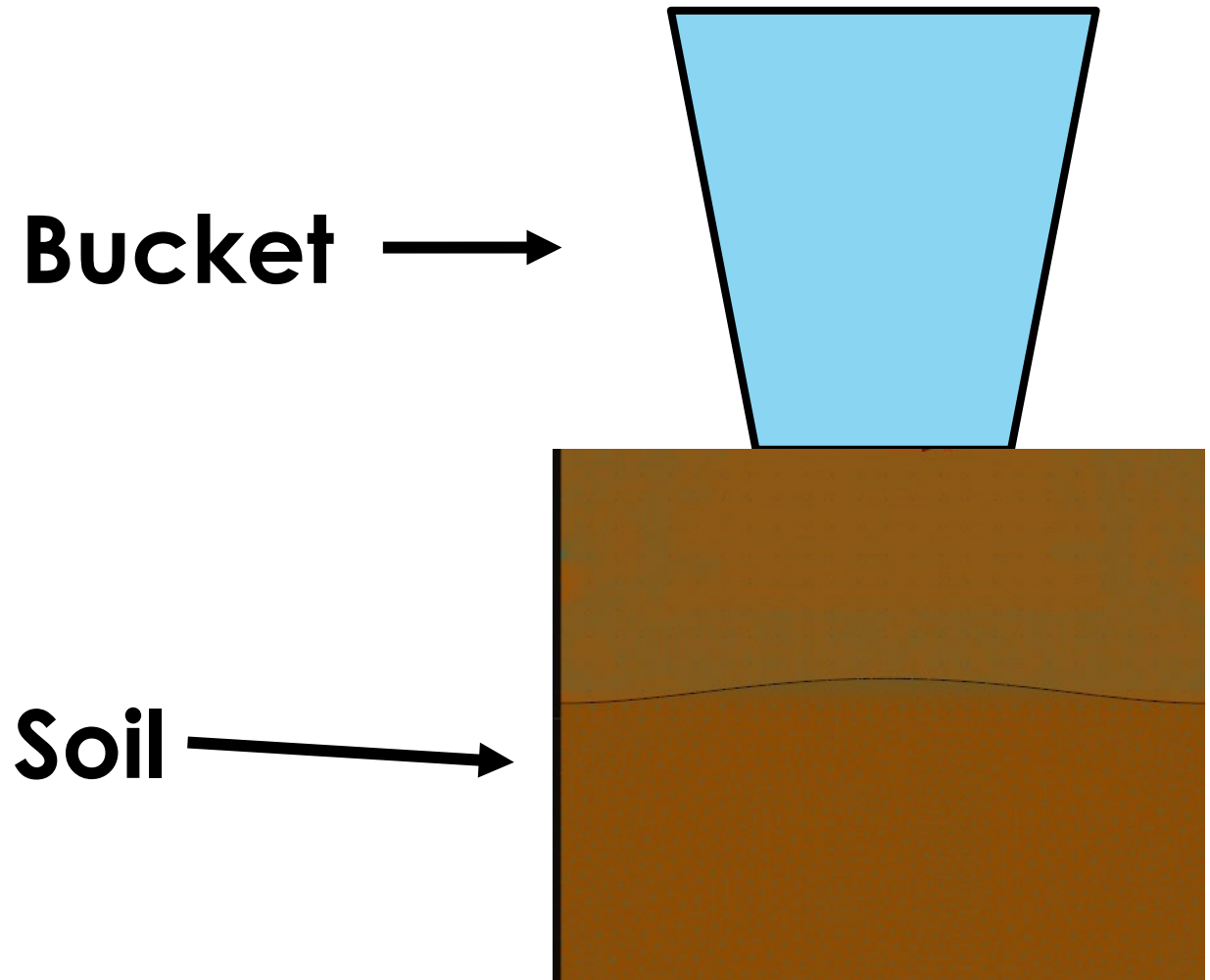
# DETERMINING FIELD CAPACITY

- Field Capacity (FC) is defined as “the content of water remaining in a soil 2 or 3 days after having been wetted with water and after free drainage is negligible” (Soil Science Society of America, 2008).
- FC will vary from field to field and even within a field due to variations in soil properties ( soil type and soil layering)
  - For example, sandy soil has a different FC value than loamy or clayey soil.
- The soil structure also has a significant effect on FC.
  - For example, FC is different before and after tilling or disking.
  - Therefore, it is important to determine FC value after the soil is prepared for fumigation.



# DETERMINING FIELD CAPACITY

Water leaves the bucket from the small openings at the bottom and infiltrates into the soil and re-distributes over 48 hours.





# DETERMINING FIELD CAPACITY

Wet the soil profile

Avoid evaporation wetting the soil

Allowing the excess water to drain

Measuring the soil moisture once the soil is at  
Field Capacity

# DETERMINING FIELD CAPACITY

## **Wet the soil profile**

The bucket allows for a relatively slow and localized introduction of water to the soil.



# DETERMINING FIELD CAPACITY

## Avoid evaporation wetting the soil

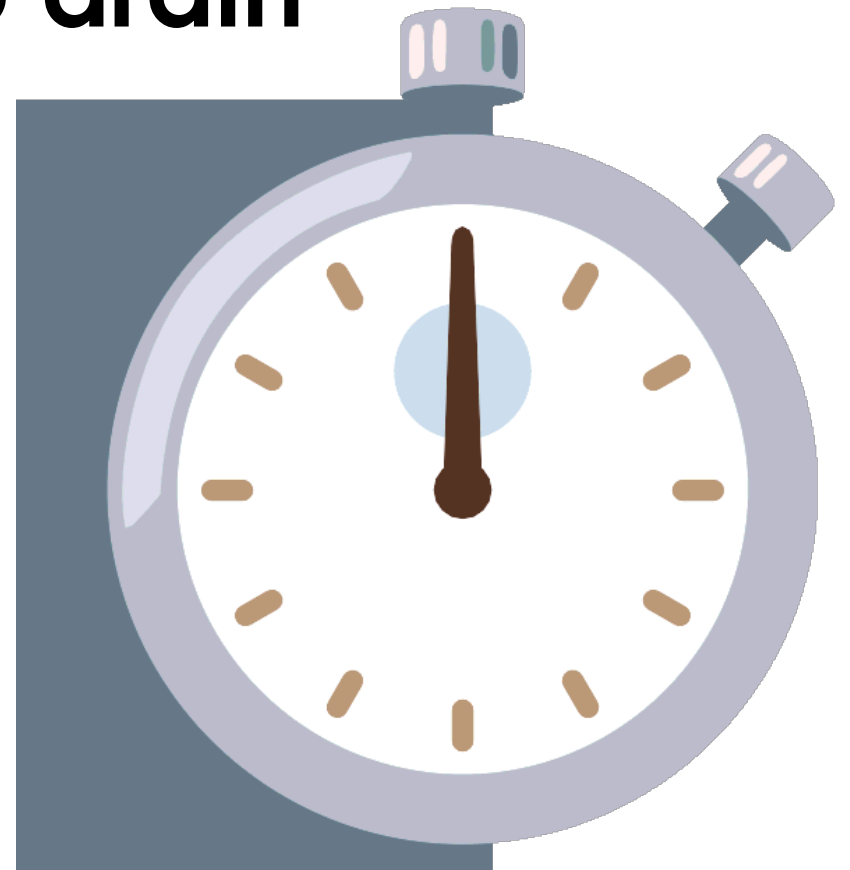
The soil around the bucket should be covered by a plastic sheet or a tarp to avoid loss of moisture via evaporation.



# DETERMINING FIELD CAPACITY

## Allowing the excess water to drain

On average, it takes about 48 hours for the excess water to be drained.



# DETERMINING FIELD CAPACITY

**Measuring the soil moisture once the soil is at Field Capacity**



# HANDS-ON TRAINING

Feel and appearance

Bucket experiment ( soil moisture)

