Methyl Bromide (with and without chloropicrin)
Field Fumigation Methods Allowed
California Code of Regulations, Chapter 3, Section 6447.3

Regulations to reduce emissions of volatile organic compounds (VOCs) from fumigant pesticides became effective on January 25, 2008. The rules focus on field fumigant applications made between May 1 and October 31 in five "nonattainment areas" (NAAs) that do not meet federal air quality standards for pesticide VOC emissions. Application method requirements depend on:

- When the fumigant will be applied, and
- Where the fumigant will be applied.

Between November 1 and April 30, there is no change. Any field fumigant method previously allowed can be used, anywhere in California. (Regulations and permit conditions that already restricted the use of some fumigants still apply.)

Throughout the year, in areas <u>outside</u> the five NAAs there is no change. Any field fumigant method previously allowed can be used, anywhere in California. (Regulations and permit conditions that already restricted the use of some fumigants still apply.)

In the five NAAs, from May 1 to October 31, field fumigations are limited to specific methods listed in the regulations. (For a map of the NAAs and a list of geographic sections affected by the field fumigant regulations, go to http://www.cdpr.ca.gov/docs/emon/vocs/vocproj/em_region.htm.)

Key to abbreviations:

SAC Sacramento Metro (All of Sacramento and Yolo, parts of El Dorado, Placer, Solano, Sutter)
SC South Coast (All of Orange, parts of Los Angeles, Riverside, San Bernardino)
SJV San Joaquin Valley (All of Fresno, Kings, Madera, Merced, San Joaquin, Stanislaus, Tulare, parts of Kern)
SED Southeast Desert (Parts of Los Angeles, Riverside, San Bernardino)
VEN Ventura (all of Ventura)

Method: Nontarpaulin/Shallow/Bed **Method Code**: 1101
MB Emission Rating: 100%
Chloropicrin Emission Rating: 64%

Method allowed (X) in these NAAs (May 1 –October 31):

SAC	SC	SJV	SED	VEN
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Method Description:

- Application rate shall not exceed 200 pounds of methyl bromide per acre.
- Application tractor shall be equipped with an air fan dilution system.
- Rearward-curved (swept-back) chisels shall be used with:
  - closing shoes and bed-shaper, or closing shoes and compaction roller; and
  - chisel injection points positioned beneath and ahead of the closing shoes.
- Injection depth shall be between 10 and 15 inches. The injection depth to preformed beds must not be below the bed furrow.
- Injection spacing shall be 40 inches or less.
- Soil shall not be disturbed for at least three days (72 hours) following completion of injection to the application beds.
- Application block restricted-entry interval shall be three days.

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Method: Nontarpaulin/Deep/Broadcast **Method Code**: 1102
MB Emission Rating: 74%
Chloropicrin Emission Rating: 64%

Method allowed (X) in these NAAs (May 1 –October 31):

SAC	SC	SJV	SED	VEN
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Method Description:

- Application rate shall not exceed 400 pounds of methyl bromide per acre.
- Forward-curved chisel shall be used with:
  - An application tractor equipped with an air fan dilution system, and the injection depth shall be at least 20 inches; or
  - Closing shoes and compaction roller and the injection depth shall be at least 24 inches.
- Injection spacing shall be 68 inches or less.
- Soil shall not be disturbed for at least four days (96 hours) following completion of injection to the application block.
- Application block restricted-entry interval shall be four days.

Method: Tarpaulin/Shallow/Broadcast **Method Code**: 1103
Nobel Plow **MB Emission Rating**: 48%
Chloropicrin Emission Rating: 44%

Method allowed (X) in these NAAs (May 1 –October 31):

SAC	SC	SJV	SED	VEN
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Method Description:

- Application rate shall not exceed 400 pounds of methyl bromide per acre.
- Application shall be made using either:
  - An application tractor equipped with an air fan dilution system, and with a plow consisting of horizontal v-shaped blades mounted by a vertical arm to the tool bar. The fumigant shall be injected laterally beneath the soil surface; or
  - Rearward-curved (swept-back) chisels, closing shoes, and compaction roller shall be used.
- Injection depth shall be at least 10 inches and no greater than 15 inches.
- Injection spacing shall be at 12 inches or less.
- The tarpaulin shall be laid down simultaneously (with fumigant injection) by tarpaulin-laying equipment mounted on the application tractor.
- Tarpaulin shall not be cut until minimum of 5 days (120 hours) following completion of injection to the application block. The tarpaulin shall be cut pursuant to 3 CCR section 6784(b)(4).
- Tarpaulin removal shall begin no sooner than 24 hours after tarpaulin cutting has been completed.
- The application block restricted-entry interval shall end at completion of tarpaulin removal, and shall be at least six days.

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Method: Tarpaulin/Shallow/Broadcast Nobel Plow - Strip

Method Code: 1104
MB Emission Rating: 74%
Chloropicrin Emission Rating: 64%

Method allowed (X) in these NAAs (May 1 –October 31):

SAC	SC	SJV	SED	VEN
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Method Description:

- Application rate shall not exceed 400 pounds of methyl bromide per acre.
- Application shall be made using either:
  - An application tractor equipped with an air fan dilution system, and with a plow consisting of horizontal v-shaped blades mounted by a vertical arm to the tool bar. The fumigant shall be injected laterally beneath the soil surface; or
  - Rearward-curved (swept-back) chisels, closing shoes, and compaction roller shall be used.
- Injection depth shall be at least 10 inches and no greater than 15 inches.
- Injection spacing shall be at 12 inches or less.
- The tarpaulin shall be laid down simultaneously (with fumigant injection) by tarpaulin-laying equipment mounted on the application tractor.
- Tarpaulin shall not be cut until a minimum of 5 days (120 hours) following completion of injection to the application block. The tarpaulin shall be cut pursuant to 3 CCR section 6784(b)(4).
- Tarpaulin removal shall begin no sooner than 24 hours after tarpaulin cutting has been completed.
- The application block restricted-entry interval shall end at completion of tarpaulin removal, and shall be at least six days.

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Method: Tarpaulin/Shallow/Broadcast
Closing shoes & compaction roller

Method Code: 1105
MB Emission Rating: 100%
Chloropicrin Emission Rating: 64%

Method allowed (X) in these NAAs (May 1 –October 31):

SAC	SC	SJV	SED	VEN
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Method Description:

- Application rate shall not exceed 400 pounds of methyl bromide per acre.
- Application shall be made using either:
  - An application tractor equipped with an air fan dilution system, and with a plow consisting of horizontal v-shaped blades mounted by a vertical arm to the tool bar. The fumigant shall be injected laterally beneath the soil surface; or
  - Rearward-curved (swept-back) chisels, closing shoes, and compaction roller shall be used.
- Injection depth shall be at least 10 inches and no greater than 15 inches.
- Injection spacing shall be at 12 inches or less.
- The tarpaulin shall be laid down simultaneously (with fumigant injection) by tarpaulin-laying equipment mounted on the application tractor.
- Tarpaulin shall not be cut until a minimum of 5 days (120 hours) following completion of injection to the application block. The tarpaulin shall be cut pursuant to 3 CCR section 6784(b)(4).
- Tarpaulin removal shall begin no sooner than 24 hours after tarpaulin cutting has been completed.
- The application block restricted-entry interval shall end at completion of tarpaulin removal, and shall be at least six days.

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Method: Tarpaulin/Shallow/Bed **Method Code**: 1106
Emission Rating: 100%
Chloropicrin Emission Rating: 64%

Method allowed (X) in these NAAs (May 1 –October 31):

SAC	SC	SJV	SED	VEN
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Method Description:

- Application rate shall not exceed 250 pounds of methyl bromide per acre.
- Rearward-curved (swept-back) chisels shall be used with either:
  - Closing shoes and compaction roller. The closing shoes shall cover the chisel marks with soil just ahead of the compaction roller, and the tarpaulin shall be laid down simultaneously (with fumigant injection) by tarpaulin-laying equipment mounted on the application tractor; or
  - Bed shaper. The chisels shall be placed with the injection point under the bed shaper, and the tarpaulin shall be laid down simultaneously (with fumigant injection) by tarpaulin-laying equipment mounted on the application tractor; or
  - Combination bed former and bed shaper. The chisels shall be placed between the bed former and the bed shaper. The tractor with the tarpaulin-laying equipment shall immediately follow the application tractor.
- Injection depth shall be between 6 and 15 inches. The injection depth to preformed beds must not be below the bed furrow.
- Injection spacing shall be 12 inches or less.
- The tarpaulin shall be cut at least five days (120 hours) following completion of injection to the application block.
- If tarpaulins are removed before planting, tarpaulin removal shall begin no sooner than 24 hours after tarpaulin cutting has been completed. The application block restricted-entry interval shall end at completion of tarpaulin removal, and shall be at least six days.
- If tarpaulins are not to be removed before planting, the application block restricted-entry interval shall either:
  - consist of the five-day period (120 hours) described above, plus an additional 48 hours after holes have been cut for planting or
  - be at least 14 days. If this option is chosen, the methyl bromide air concentration underneath the tarpaulin must test less than five parts per million (5 ppm) before planting begins.

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Method: Tarpaulin/Deep/Broadcast **Method Code**: 1107
MB Emission Rating: 48%
Chloropicrin Emission Rating: 44%

Method allowed (X) in these NAAs (May 1 –October 31):

SAC	SC	SJV	SED	VEN
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Method Description:

- Application rate shall not exceed 400 pounds of methyl bromide per acre.
- Forward-curved chisels shall be used with either:
  - An air fan dilution system on the application tractor; or
  - Closing shoes and compaction roller.
- Injection depth shall be at least 20 inches.
- Injection spacing shall be 66 inches or less.
- The tarpaulin shall be laid down simultaneously (with fumigant injection) by tarpaulin-laying equipment mounted on the application tractor.
- Tarpaulin shall not be cut until at least five days (120 hours) following completion of injection to the application block. The tarpaulin shall be cut pursuant to 3CCR section 6784(b)(4).
- Tarpaulin removal shall begin no sooner than 24 hours after tarpaulin cutting has been completed.
- The application block restricted entry interval shall end at completion of tarpaulin removal, and shall be at least six days.

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Method: Tarpaulin/Deep/Broadcast - Strip **Method Code**: 1108
MB Emission Rating: 74%
Chloropicrin Emission Rating: 64%

Method allowed (X) in these NAAs (May 1 –October 31):

SAC	SC	SJV	SED	VEN
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Method Description:

- Application rate shall not exceed 400 pounds of methyl bromide per acre.
- Forward-curved chisels shall be used with either:
  - An air fan dilution system on the application tractor; or
  - Closing shoes and compaction roller.
- Injection depth shall be at least 20 inches.
- Injection spacing shall be 66 inches or less.
- The tarpaulin shall be laid down simultaneously (with fumigant injection) by tarpaulin-laying equipment mounted on the application tractor.
- Tarpaulin shall not be cut until at least five days (120 hours) following completion of injection to the application block. The tarpaulin shall be cut pursuant to 3CCR section 6784(b)(4).
- Tarpaulin removal shall begin no sooner than 24 hours after tarpaulin cutting has been completed.
- The application block restricted entry interval shall end at completion of tarpaulin removal, and shall be at least six days.

Method: Drip System – Hot Gas **Method Code**: 1109
MB Emission Rating: 100%
Chloropicrin Emission Rating: 100%

Method allowed (X) in these NAAs (May 1 –October 31):

SAC	SC	SJV	SED	VEN
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Method Description:

- Application rate shall not exceed 225 pounds of methyl bromide per acre.
- The fumigant shall be injected beneath the soil surface at a depth of one (1) inch.
- The portion of the drip system used in the fumigation shall be physically disconnected from the main water supply during the fumigation to prevent possible contamination of the water supply.
- All fittings and emitters underneath the tarpaulin shall be buried in the soil to a minimum depth of one (1) inch.
- Prior to the start of the fumigation, all drip tubing shall be checked for blockage, and the irrigation system connections and fittings checked for blockage and leaks using pressurized air and/or water. The ends of each drip tubing shall be placed under the tarpaulin prior to introduction of fumigant.
- The tarpaulin shall be placed and inspected for tears, holes, or improperly secured edges prior to fumigating. Repairs and adjustments shall be made before the fumigation begins.
- Prior to the start of the fumigation, all fittings above ground and outside of the tarpaulin shall be pressure-tested with compressed air, water, or nitrogen gas to a maximum pressure of 50 pounds per square inch. A soap solution shall be used to check the fittings for leaks if using air or nitrogen. All apparent leaks shall be eliminated prior to the fumigation. All drip tubing with emitters connected to the distribution manifold not covered by the tarpaulin shall be sealed to prevent fumigant loss through the emitters.
- Prior to introducing the fumigant, the drip system shall be purged of water by means of pressurized gas, such as CO_2 or nitrogen.
- The drip system shall be purged prior to disconnecting any line containing the fumigant.
- After purging, drip tubing shall be pinched off and then disconnected from the distribution manifold. All disconnected tubing leading into the treated field shall be secured to prevent gas from escaping.
- All fittings used for connecting or disconnecting the heat exchanger to the irrigation system manifold shall be of a positive shut-off design.
- All persons shall wear the eye protection specified on the label when working with a manifold system or tubing containing the fumigant under pressure.
- The entire fumigation system (heater, valves, and manifold) shall be purged of the fumigant at the end of each day's fumigation.
- The tarpaulin shall not be cut until at least five days (120 hours) following completion of injection to the application block.
- If tarpaulins are removed before planting tarpaulin removal shall begin no sooner than 24 hours after tarpaulin cutting has been completed. The application block restricted-entry interval shall end at completion of tarpaulin removal and shall be at least six (6) days.
- If tarpaulins are not to be removed before planting, the application block restricted- entry interval shall either:
    - consist of the five-day period (120 hours) described above, plus an additional 48 hours after holes have been cut for planting, or
    - be at least 14 days. If this option is chosen, the methyl bromide air-concentration underneath the tarpaulin must test less than five parts per million before planting begins.