



Technical Data Bulletin

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California Department of Pesticide Regulation Respiratory Protection Requirements for Pesticide Workers During Field Soil Fumigation Using Methyl Bromide

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Introduction

In October, 2010 the California Department of Pesticide Regulation amended its regulations for methyl bromide use that include requirements for use of respiratory protective equipment. This summary of respiratory protection requirements found in the regulation was prepared by 3M Personal Safety Division and focuses primarily on the selection and use of respiratory protective equipment. It does not represent an official, legal nor complete interpretation of the regulation. If specific questions arise, the regulation itself should be reviewed and relied on, rather than this summary. A copy of the regulation may be viewed at http://www.cdpr.ca.gov/docs/legbill/s/rulepkgs/10002/text_final.pdf. A guidance manual can be viewed at <http://www.cdpr.ca.gov/docs/county/training/methbrom/mebrman.pdf>.

The regulations allow use of NIOSH approved respiratory protection specifically recommended by the manufacturer for use in atmospheres containing 5 ppm or less methyl bromide. While NIOSH does not have a test procedure to certify air

purifying filters against methyl bromide, 3M recommends the NIOSH approved 3M™ Cartridge/Filter 60928, Organic Vapor/Acid Gas/P100 Cartridges for use against methyl bromide at ambient concentrations up to 5 ppm and for not more than one shift. This cartridge is approved in combination with several 3M™ Half and Full Facepiece Respirators, including the 3M™ Half Facepiece Respirators 6000, 6500 and 7500 Series and the 3M™ Full Facepiece Respirators 6000, 7800S and FF-400 Series.

What is Methyl Bromide?

Methyl bromide is a colorless, odorless gas at room temperature. It is widely used as a fumigant prior to planting to eradicate fungus, nematodes, microorganisms and weeds from the soil. In the United States, methyl bromide is used on strawberries, lettuce, grapes, and other perishable crops. Methyl bromide is a restricted use agricultural pesticide, available under a variety of common or trade names including Tri-Con, Terr-o-Gas, Pic-Brom,

and Celfume. The U.S. Environmental Protection Agency (EPA) through the Clean Air Act (CAA) proposed to phaseout methyl bromide use in the United States by January 1, 2005. However, CAA Critical Use Exemption provisions permit continued use today.

Methyl bromide-containing soil fumigants are commonly mixed with chloropicrin in various proportions. At low concentrations, chloropicrin is used as an odorant for the detection of methyl bromide. At higher concentrations (up to 50%), chloropicrin acts as a fungicide. Chloropicrin is considered a strong eye irritant at air concentrations equal to or slightly above the OSHA PEL. Current workplace exposure limits for methyl bromide include an OSHA STEL of 20 ppm Ceiling, and ACGIH TLV of 1 ppm 8-hour TWA. Both exposure limits include a skin notation. The PEL for chloropicrin is 0.1 ppm 8-hour TWA.

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Respiratory Protection Requirements for Pesticide Workers During Field Soil Fumigation Using Methyl Bromide

Summary of Section 6784 California Food and Agricultural Code

Section 6784 of the California Food and Agricultural Code describes worker protection requirements for the use of methyl bromide during soil fumigation. Respiratory protection provisions include product selection and use limitations based on the specific fumigation handling activity (task), application rate, and the frequency of exposure. Employers have been given the option of selecting respiratory protection based on either daily exposures (Table 1), or for those employees with less frequent exposures, on a monthly basis (Table 2). The monthly exposure respirator selection option is limited to a maximum of 3 exposure workdays per month. Switching between the daily and monthly options is not allowed unless the employee did not perform fumigation handling activities during the previous 30 days. Unless an approved respirator is selected, employees are limited to maximum daily work hours based on the specific task performed for both exposure option choices.

Where required under section 6784, NIOSH approved respiratory protection that is either an air purifying chemical cartridge respirator specifically recommended by the manufacturer for use in atmospheres containing 5 ppm or less methyl bromide, or an atmosphere supplying respirator (i.e., supplied air system or SCBA) must be selected. Employees must wear the required respiratory

protection during the entire duration of the fumigation handling activity.

For those employers selecting the daily exposure option (Table 1), a half facepiece, air-purifying respirator is the minimum respiratory protection required for most fumigation handling activities. To avoid the maximum daily work hour limitation, a full facepiece, air-purifying respirator is required for those employees receiving daily exposures. A few tasks, such as tarpaulin cutting and removal, allow the employee to perform the activity without respiratory protection for short durations.

Respiratory protection is not required for those employers selecting the monthly exposure option (Table 2), provided the task is completed within the maximum daily work hours allowed. An employee may perform the fumigation handling activity without the work-hour limitation provided a minimum half facepiece air-purifying respirator is worn during the entire duration of the task.

Respiratory protection requirements described in Table 1 and 2 generally apply to fumigation handling activities performed during the methyl bromide injection process or tarpaulin cutting and removal. Prior to the expiration of the restricted entry interval, for any task performed inside the application block (treatment area) other than those

described in Table 1 and Table 2, a full facepiece air-purifying respirator must be worn. The restricted entry interval is a minimum of 6 days for those fumigation methods where the tarpaulin is removed, and a minimum of 7 days for those methods where the tarpaulin is not removed. For all tarpaulin repair work, ambient air monitoring for methyl bromide must be completed prior to conducting repair. Air concentrations must be less than 5 ppm before an employee that is not using respiratory protection is allowed to enter the area. Under these conditions, the employee is limited to 1 work hour in a 24-hour period unless approved respiratory protection is worn.

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Respiratory Protection Requirements for Pesticide Workers

During Field Soil Fumigation Using Methyl Bromide

Table 1— Maximum Work Hours

Section 6784 California Food and Agricultural Code

Fumigation Method/Activities	Maximum Application Rate (lbs of methyl bromide)	Maximum Work Hours in a 24-Hour Period Wearing a Half Facepiece Respirator During Entire Fumigation Handling Activity
Nontarpaulin/Shallow/Bed: Tractor Equipment Driving Supervising	200 lbs	8* 8*
Nontarpaulin/Deep/Broadcast: Tractor Equipment Driving Supervising	400 lbs	8* no limitation ¹
Tarpaulin/Shallow/Broadcast: Tractor Equipment Driving Shoveling, Copiloting Supervising Tarpaulin Cutting Tarpaulin Removal	400 lbs	7* 3* 3* 10 ¹ no limitation ²
Tarpaulin/Shallow/Bed: Tractor Equipment Driving Shoveling, Copiloting Supervising Tarpaulin Cutting Tarpaulin Removal	250 lbs	no limitation 6* 6* 10 ¹ no limitation ²
Tarpaulin/Deep/Broadcast: Tractor Equipment Driving Shoveling, Copiloting Supervising Tarpaulin Cutting Tarpaulin Removal	400 lbs	7* 3* 3* 10 ¹ no limitation ²
Drip System— Hot Gas: Applicators Supervising Tarpaulin Cutting Tarpaulin Removal	225 lbs	4* 4* 10 ¹ no limitation ²

¹Exception: An employee may perform this activity without a half facepiece respirator provided the employee does not work more than one hour in a 24-hour period. The maximum one-hour work limitation may be increased in accordance with the formula located at the bottom of Table 2.

²Exception: An employee may perform this activity without a half facepiece respirator provided the employee does not work more than three hours in a 24-hour period. The maximum three-hour work limitation may be increased in accordance with the formula located at the bottom of Table 2.

*If the actual methyl bromide application rate is less than the maximum application rate shown in Table 1 or Table 2 for the particular fumigation method used, the maximum work hours may be increased in accordance with the following formula:

$$\frac{\text{maximum application rate for method}}{\text{actual application rate}} \times \text{maximum work hours in a 24-hour period} = \text{revised maximum work hours in a 24-hour period}$$

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Table 2— Maximum Hours in a Maximum Three (3) Workdays Per Calendar Month
Section 6784 California Food and Agricultural Code

Fumigation Method/Activities	Maximum Application Rate (lbs of methyl bromide)	Maximum Work Hours in a 24-Hour Period Without the Use of Respirators
Nontarpaulin/Shallow/Bed: Tractor Equipment Driving Supervising	200 lbs	4* 4*
Nontarpaulin/Deep/Broadcast: Tractor Equipment Driving Supervising	400 lbs	4* 7*
Tarpaulin/Shallow/Broadcast: Tractor Equipment Driving Shoveling, Copiloting Supervising Tarpaulin Cutting Tarpaulin Removal	400 lbs	4* 3* 3* 4 7
Tarpaulin/Shallow/Bed: Tractor Equipment Driving Shoveling, Copiloting Supervising Tarpaulin Cutting Tarpaulin Removal	250 lbs	4* 4* 4* 4 7
Tarpaulin/Deep/Broadcast: Tractor Equipment Driving Shoveling, Copiloting Supervising Tarpaulin Cutting Tarpaulin Removal	400 lbs	4* 3* 3* 4 7
Drip System— Hot Gas: Applicators Supervising Tarpaulin Cutting Tarpaulin Removal	225 lbs	2* 2* 4 7

*If the actual methyl bromide application rate is less than the maximum application rate shown in Table 1 or Table 2 for the particular fumigation method used, the maximum work hours may be increased in accordance with the following formula:

$$\frac{\text{maximum application rate for method}}{\text{hours actual application rate}} \times \text{maximum work hours in a 24-hour period} = \text{revised maximum work in a 24-hour period}$$

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Methyl Bromide Challenge

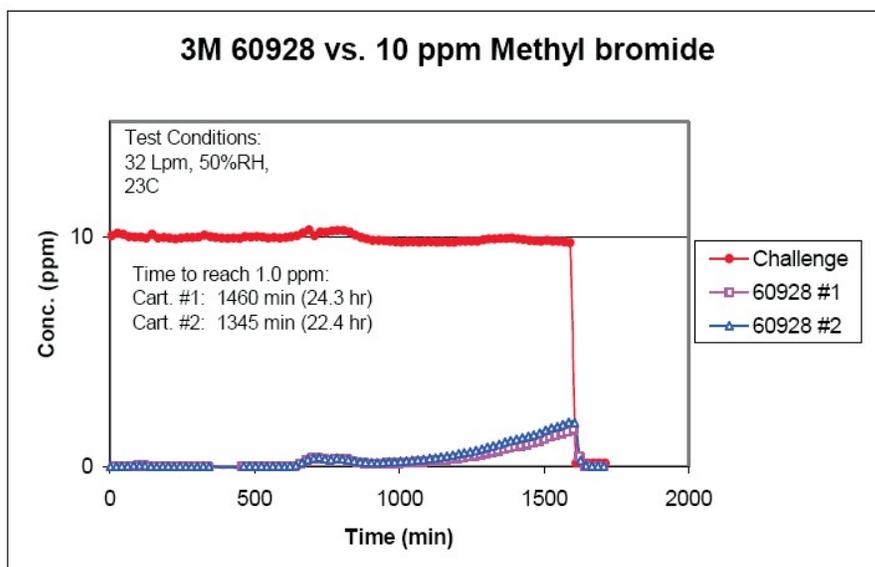
Test: Procedures

To demonstrate that the 3M™ Cartridge/Filter 60928, Organic Vapor/Acid Gas/P100 Cartridges are effective against methyl bromide, 3M challenged the cartridge against 10 ppm methyl bromide as described at the right.

Test Parameter	3M Test
Vapor	CHBr
Concentration	10 ppm
Relative Humidity	50 +/-2%
Temperature	23°C
Flow	32 L/min Steady Flow
Maximum Penetration	1 ppm (instantaneous)

Test Results

The graph to the right shows the time required for the concentration in the effluent to reach 1.0 ppm. As shown, at a challenge level of 10 ppm the cartridges lasted over 20 hours before reaching 1.0 ppm in the effluent. At the end of the test, the methyl bromide source was turned off (i.e. only clean air passed into the cartridge) and the effluent from cartridges returned to the baseline. This is significant because it shows the methyl bromide has been captured and does not migrate through the carbon bed, and migration is not expected to occur during the work shift.



3M Recommendations For Use

Respiratory protection is regulated in the workplace under OSHA 29 CFR 1910.134. Employers must comply with all requirements of 1910.134, including, but not limited to, medical evaluations, training and fit testing, prior to using respirators. Fit testing provisions require that all workers wearing a tight-fitting, half or full facepiece respirator must pass a quantitative or qualitative fit test.

Certain states, including California, may also have their own OSHA State Plan or other regulatory requirements for respiratory protection. Refer to both federal and state requirements prior to using respirators.

Based on the 3M methyl bromide challenge test results, and to be conservative with regards to safety, 3M recommends the NIOSH approved 3M cartridge/filter 60928, organic

vapor/acid gas/P100 cartridge be used for a maximum of one shift, and only in areas where the methyl bromide concentration does not exceed 5 ppm. This recommendation applies to workers performing fumigation handling activities, as described in section 6784 of the California Food and Agricultural Code, and Table 1 and Table 2.

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Respiratory Protection Requirements for Pesticide Workers During Field Soil Fumigation Using Methyl Bromide

Soil Fumigant Products Containing Chloropicrin

For methyl bromide applications used in combination with chloropicrin, 3M recommends the use of eye protection meeting requirements of the ANSI Z87.1-2010 Standard. Eye protection may include use of a full

facepiece respirator or half facepiece respirator with gas proof goggles. Estimated service life for the 3M cartridge/filter 60928, organic vapor/acid gas/P100 cartridge against chloropicrin is well beyond the daily change-out recommended for methyl bromide. A summary of Section 6784 California Food and

Agricultural Code respirator selection requirements, and recommended 3M respiratory protection products is presented in the following table.

Summary of Respiratory Protection Selection Using 3M 60928 Cartridge Section 6784 California Food and Agricultural Code

	Daily Exposures (Table 1)	Monthly Exposures (Table 2)
Is respiratory protection required with maximum work-hour limitations?	Yes	No
Minimum respiratory protection with maximum work-hour limitations	Half Facepiece Respirator¹ 3M™ Half Facepiece Respirator 6000 Series 3M™ Rugged Comfort Half Facepiece Respirator 6500 Series 3M™ Half Facepiece Respirator 7500 Series	Not Required
Minimum respiratory protection without maximum work-hour limitations	Full Facepiece Respirator¹ 3M™ Full Facepiece 6000 Series 3M™ Full Facepiece 7800S Series 3M™ Ultimate FX Full Facepiece FF-400 Series	Half Facepiece Respirator¹ 3M™ Half Facepiece Respirator 6000 Series 3M™ Rugged Comfort Half Facepiece Respirator 6500 Series 3M™ Half Facepiece Respirator 7500 Series
Minimum respiratory protection in application block prior to expiration of restricted entry interval	Full Facepiece Respirator² 3M™ Full Facepiece 6000 Series 3M™ Full Facepiece 7800S Series 3M™ Ultimate FX Full Facepiece FF-400 Series	Full Facepiece Respirator² 3M™ Full Facepiece 6000 Series 3M™ Full Facepiece 7800S Series 3M™ Ultimate FX Full Facepiece FF-400 Series
Minimum respirator protection for methyl bromide exposures above 5 ppm	Supplied Air or SCBA Please call 3M Technical Service at (800) 243-4630 for product selection	Supplied Air or SCBA Please call 3M Technical Service at (800) 243-4630 for product selection

¹Minimum requirement for most fumigation handling activities. Exceptions are included in Table 1 and Table 2. 3M recommends a full facepiece respirator for methyl bromide soil fumigants containing chloropicrin.

²Minimum requirement during entry in treatment area for tasks other than designated fumigation handling activities and tarpaulin repair.

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Respiratory Protection Requirements for Pesticide Workers
During Field Soil Fumigation Using Methyl Bromide**



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In the U.S., contact:

Customer Service

1-800-328-1667

Technical Assistance

1-800-243-4630

Website

www.3M.com/PPESafety

For other 3 M products

1-800-3M HELPS

In Canada, contact:

3M Canada Company, OH&ESD

P.O. Box 5757

London, Ontario N6A 4T1

Customer Care

1-800-364-3577

Technical Assistance (Canada only)

1-800-267-4414

Website

www.3M.ca/safety

Technical Assistance In Mexico

01-800-712-0646

5270-2255, 5270-2119 (Mexico City only)

Technical Assistance In Brazil

0800-132333