

## Appendix 6

### California Aeration Plan (CAP) for Structural Fumigations

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**Scope** The structural pest control industry has developed the California Aeration Plan (CAP) as a Fumigation Safety Program (Program), for employers and employees to follow to meet the requirements of Title 3, California Code of Regulations (3 CCR) section 6780. Employers may use this Program in lieu of requiring air-supplied respirator equipment or continuous monitoring when aerating tarp-contained or tape/seal structural fumigations with sulfuryl fluoride. CAP may be used for all structural fumigations such as dwellings, multi-unit buildings, commercial and industrial structures as well as boats, transport vehicles, sheds, garages/carports and gazebos.

While the use of a self-contained breathing apparatus (SCBA) is legally acceptable under Department of Pesticide Regulation (DPR) regulations for removing tarps from any structure, the CAP plan minimizes the potential risk to workers by providing the option to remove tarps without the use of an SCBA.

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**Plan overview** Fumigant aeration is conducted remotely by pre-positioned inlet devices, ducting and aeration fans. CAP supersedes Aeration Procedure 1 and Aeration Procedure 2 on sulfuryl fluoride product labeling. Follow all other sulfuryl fluoride product labeling. If equipment failure or other mishap requires entry to a fumigated structure or space before the completion of aeration, employees must use an SCBA or continuous monitoring of fumigant levels. CAP is designed to complement existing fumigation requirements.

When security conditions allow consider using the lowest dosage rate of chloropicrin allowed by the sulfuryl fluoride product labeling or sulfuryl fluoride dosage calculator. Chloropicrin should be placed in rooms/areas which are actively aerated in accordance with CAP. Chloropicrin pans should not be placed in rooms with a heavy storage load. Utilize fans to assist in aeration of rooms with a heavy storage load.

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**Preparation for fumigation:  
Internal openings** If the structure has an attached garage, open the door between the garage and the structure. Each operable attic access must be open. Direct a circulation fan into each attic. If an attic has multiple attic accesses a fan is not required for each access.

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## CAP for Structural Fumigations, Continued

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**Preparation for fumigation:  
External openings**

Open at least one operable window at least 3 inches for each room, including the garage, that contains a window that can be accessed and opened by normal means (without moving furniture, removing nails, or cutting a paint seal). If a room does not have an operable window, use a circulation fan to aid aeration of that room. For example, a circulation fan in the hall could be used to aid aeration of bedrooms and bathrooms.

There is not a minimum size requirement for a room without windows which requires a fan to aid aeration, such as internal bathrooms, walk-in closets and pantries.

While there is no requirement to place a fan in every room without an operable window, the fumigator must provide for aeration of the entire fumigated space using inlet devices, aeration fans and circulation fans.

For multi-story structures, windows on the ground level may be left closed provided the ground level has a common interior airspace with an upper floor and fans are placed to create air movement from the ground level to the upper floor.

If a majority of rooms have no operable windows, use an alternative fresh air source (doorway, air handling system, etc.). If doorways are used to allow for air exchanges, the doors must be secured against unauthorized entry. This may require fastening vented security barricades over doorways.

When a storage shed is attached on the outside of the structure, or there is a storage room under a staircase, a circulation fan is not required to aid aeration. If the shed has an operable window it must be opened a minimum of three inches. If there is no window, the door must be used to provide the fresh air exchange by opening it a minimum of three inches and securing it against unauthorized entry.

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**Preparation for fumigation:  
Aeration Devices**

Aeration equipment is comprised of aeration fans (connected to aeration ducting), aeration ducting and inlet devices (inlets). For tarpaulin fumigations, aeration equipment is installed prior to fumigation so aeration can be initiated from outside the fumigated space.

Aeration ducting, duct covers, inlets and inlet covers are part of the seal during the fumigation exposure period and must be constructed of material that has the same retention and durability capabilities (at least 4 mil thickness) as required by the sulfuryl fluoride product labeling and 16 CCR section 1970.1(b).

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## CAP for Structural Fumigations, Continued

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**Preparation  
for  
fumigation:  
Aeration  
Devices  
(continued)**

### AERATION FANS

Each aeration fan must be at least 18 inches in diameter. The minimum number of aeration fans required depends upon the volume of the fumigated structure and is specified in Table 1. Aeration fans are turned on only to ventilate fumigant from the structure.

Place aeration fans within the fumigated space to draw fresh air through the structure. Use extension cords, remote relays, or other devices during aeration fan installation to enable activation of aeration fans from outside of the fumigated space at the initiation of aeration.

### AERATION DUCTING

The aeration ducting shall be constructed in a manner that maintains its minimum 18-inch diameter without being inflated by the airflow (static pressure) of the fan. The intention is for the aeration ducting to have the same internal size (cross sectional diameter) whether the fan is operating or not.

Connect each aeration fan securely to durable reinforced ducting, minimum 18-inch diameter, so the aeration ducting does not easily collapse or restrict airflow when installed through the tarpaulin or when it is extended.

Extend the aeration ducting from the attached fan inside the fumigated space, through tarpaulins, to the first story roofline or at least 10 feet above ground level for higher rooflines. Position the aeration ducting so the release point of the duct is outside the tarpaulin and fumigant is discharged vertically. Place aeration ducting in an open area away from sensitive areas such as occupied structures. Whenever practical, spacing aeration ducting across the side of the structure where they are located helps to facilitate aeration of the structure.

The aeration ducting shall be designed and sealed in a manner that allows it to be opened remotely from ground level when aeration is initiated. If the aeration duct cover cannot be opened remotely due to malfunction, an SCBA must be used when removing the duct cover. The duct cover shall not restrict or block the aeration duct opening after the duct cover is removed.

### INLET DEVICES

The objective of inlet devices is to draw in fresh air to create negative air pressure and promote cross-ventilation of the structure. The size of the inlets does have an influence on creating the negative pressure which helps pull

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## CAP for Structural Fumigations, Continued

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**Preparation for fumigation:**  
**Aeration Devices**  
(continued)

fresh air through the structure. In addition, spacing sets of inlets across the side of the structure where inlets are located helps to facilitate aeration of the structure.

Inlet devices must: (1) maintain the integrity of the required opening, (2) have an opening of at least 240 square inches up to a maximum opening of 381 square inches, (3) have the opening covered with material allowing ventilation, such as wire, plastic netting or mesh, (4) be located where the opening is not blocked and will draw in fresh air to create negative air pressure and promote cross-ventilation of the structure, (5) have the entire inlet opening be at least 4 feet above exterior grade and (6) be sealed in a way that allows external opening during aeration.

Whenever possible, place inlet devices on the side of the structure opposite from the side where the aeration ducting is located. For some structures it will not be practical to arrange the aeration fans and inlet devices on opposite sides of the structure. If a non-standard arrangement of the required inlet devices and aeration fans is used, air flow must be managed (for example, through circulation fans) to provide for aeration of the entire fumigated space. The minimum number of inlets required depends upon the volume of the fumigated structure and is specified in Table 1.

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**Aeration and Reentry**

The minimum time required to aerate the structure is determined by the initial concentration of sulfuryl fluoride introduced and is specified in Table 2. No workers are allowed on the roof without use of an SCBA when aeration fans are operating. Do not begin aeration between midnight and 30 minutes before sunrise, unless specifically permitted by local regulatory authority.

When the high ambient temperature for the aeration period is below 40°F at the fumigation site, a minimum of 24 hours of aeration is required.

**All of the following steps, 1-6 must be completed in sequence.** (Tasks in steps may be accomplished in either order.) A licensed Operator or Field Representative must be present for, and assure completion of, Steps 1 through 6.

**Step 1:**

To initiate aeration, remove the seal or duct cover from each previously installed aeration duct and activate the aeration fan(s). If the duct cover cannot be opened remotely due to malfunction, an SCBA must be used when opening the duct cover.

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## CAP for Structural Fumigations, Continued

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**Aeration and  
Reentry**  
(continued)

**Step 2:**

After all aeration fans are activated, remove the inlet cover from each previously installed inlet device.

**Step 3:**

Any time after the required hours of aeration are completed, as specified in Table 2, turn off the aeration fan(s).

**Step 4:**

Remove all tarpaulins and/or seals from the structure.

Do not enter the structure without SCBA or continuous monitoring until the completion of Step 6.

**Step 5:**

If the structure has a central air system, turn on only the fan (or blower) for each operational unit. As an alternative, a circulation fan may be placed in front of a furnace inlet to blow air into central heating and cooling ducts. Remove all chloropicrin evaporation containers from the fumigated space.

**Step 6:**

Measure the concentration of sulfuryl fluoride in breathing zones (where people typically stand, sit or lie down) using an approved detection device as per sulfuryl fluoride product labeling. If the concentration of sulfuryl fluoride is greater than 1 ppm or warning properties of chloropicrin are detected, continue ventilation with doors and windows open until aeration is completed. Confirm sulfuryl fluoride concentrations are 1 ppm or less.

Structure may be reoccupied when the concentration of sulfuryl fluoride is 1 ppm or less.

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**Respiratory  
Protection  
Requirement**

Persons entering a fumigated structure in response to equipment malfunction or emergency at any time before certification for re-occupancy is completed, must use SCBA as required by 3 CCR section 6739 and 16 CCR section 1971.

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## CAP for Structural Fumigations, Continued

**TABLE 1**

### Determining the Number of Ducted Aeration Fans and Inlet Devices

<b>Fumigated Structure Size (cubic feet)</b>	<b>Number of Ducted Aeration Fans</b>	<b>Number of Inlet Devices</b>	<b>Total Inlet Size Range: (minimum of 240 sq. inches, maximum of 381 sq. inches for each Inlet Device)</b>
60,000 or less	1	2-3	480 sq. inches to 762 sq. inches
60,001 to 120,000	2	3-4	720 sq. inches to 1,143 sq. inches
120,001 to 180,000	3	4-5	960 sq. inches to 1,524 sq. inches
180,001 to 240,000	4	5-6	1,200 sq. inches to 1,905 sq. inches
for each additional 60,000 over 240,000	1 additional ducted aeration fan unit AND	1-2 additional inlet device(s)*	adding a minimum of 240 sq. inches up to a maximum of 381 sq. inches per additional inlet device

### Calculating the Number and Size of Inlet Devices to fall within the Total Inlet Size Range

The number of inlet devices listed in the third column and their total combined surface area must fall within the total inlet size range listed in the last column.

Example: Fumigated Structure Size of 60,000 cubic feet or less:

- 3 inlets x 240 sq. inches (minimum) = 720 sq. inches and is within the “total inlet size range” of 762 sq. inches
- 2 inlets x 381 sq. inches (maximum) = 762 sq. inches, the maximum of the “total inlet size range”
- 3 inlets x 381 sq. inches = 1,143 sq. inches and is in excess of the “total inlet size range” of 762 sq. inches

### Increasing the Ratio of Inlet Devices to Ducted Aeration Fans for Structures over 240,000 Cubic Feet:

\*It is important to maintain some negative pressure in the structure during CAP, as indicated by tarpaulins tightening after aeration fans are activated and inlet devices are opened. The greater the structure volume, the greater the stress on the tarpaulins.

To prevent excessive tightening of the tarpaulins against the structure, it may be necessary to increase the ratio of inlet devices to ducted aeration fans by adding extra inlet devices during the preparation phase in structures over 240,000 cubic feet.

As the size of the building increases, the ratio of inlet devices to ducted aeration fans can increase to a maximum of two inlet devices per ducted aeration fan.

During initiation of CAP, after the ducted aeration fans are turned on and the required number of inlet devices are opened, if tarpaulins appear to be tightening too much against the structure, additional inlet devices can be opened to relieve stress on the tarpaulins.

## CAP for Structural Fumigations, Continued

**TABLE 2**

### Determining Minimum Aeration Time

Determining Minimum Aeration Time Initial Concentration of Sulfuryl Fluoride Introduced (ounces per thousand cubic feet)	Minimum Aeration Time (hours)**
16 or less	12
17 to 32	14
33 to 48	16
49 to 64	18
65 to 96	20
97 to 112	22
> 112	24

\*\*When the high ambient temperature for the aeration period is below 40°F at the fumigation site, a minimum of 24 hours of aeration is required.

### **BLOW OPENS**

The fumigation company must comply with 3 CCR section 6780 when a fumigation “blows open.” Determine fumigant level in the exterior workspace before resealing or removing tarpaulins. If the level is above 1 ppm in the exterior workspace, use an SCBA when resealing or removing tarpaulins.

If the job is finished, it can be resealed and aerated using CAP. If the job is finished and cannot be resealed, tarpaulins can be removed. Aeration must be completed using Aeration Procedure 1 or Aeration Procedure 2 from the sulfuryl fluoride product labeling.

If the job is not finished, it can be resealed, more fumigant added if necessary, and CAP used for aeration. If the fumigation cannot be resealed and is to be rescheduled for a later date, tarpaulins can be removed. Aeration must be completed using Aeration Procedure 1 or Aeration Procedure 2 from the sulfuryl fluoride product labeling.

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