

Chloropicrin Fumigant REDs Regulations Overview¹

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In 1996, the U.S. Environmental Protection Agency (EPA) was mandated by passage of the Food Quality Protection Act to reregister all pesticides to ensure that they continue to pose no unreasonable risks of exposure to workers, bystanders, or people living in close proximity to treated fields. The EPA completed the risk assessments for chloropicrin in 2009 and published all of the changes and new label requirements within the Reregistration Eligibility Decisions (REDs) for chloropicrin at <http://www.regulations.gov/search/Regs/home.html#documentDetail?D=EPA-HQ-OPP-2005-0125-0519>. After review and approval by state regulatory agencies, manufacturers and distributors for these fumigants will be asked to affix the new product labels to each product container, making the new label *the law* in terms of product use. Some changes are expected before the fumigant labels are finalized by the State of Florida. Many of the changes that will appear on the product label will take effect in 2010, and the rest will take effect in 2011. All will require fumigant applicators and growers to implement a series of new measures to mitigate or reduce bystander and worker exposure risks from fumigant application in agricultural fields. From the REDs, a general overview of the new mitigation measures growers and certified applicators will be required to implement include:

- Respiratory protection and air monitoring for handlers
- Restrictions on the timing of perforating and removing tarps
- Posting
- Good agricultural practices (GAPs)
- Fumigant management plans (FMPs)
- Emergency preparedness and response plans
- Notice to state leading agencies
- Training for applicators and other handlers
- Community outreach and education programs

Timeline for Implementation

New label regulations scheduled for implementation in 2010:

- Restricted use registration (already registered as restricted use)
- GAPs

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- New handler protections
- Extended worker reentry restrictions
- Training information for workers
- FMPs
- First responder and community outreach
- Applicator training
- Compliance assistance and assurance measures

New label regulations scheduled for implementation in 2011:

- Buffer zones (nonfumigated areas separating fumigated field and neighboring property)
- Restrictions regulating proximity of fumigation operations to sensitive areas
- Buffer zones around all occupied structures
- Buffer credits for GAPs and other best practices
- Buffer posting
- Buffer overlap prohibitions
- Emergency preparedness measures

Mandatory Good Agricultural Practices (GAPs) for Chloropicrin

As part of the fumigant reregistration decisions, the EPA has decided that new fumigant labels should require proven practices that will reduce risks to handlers, bystanders, and the environment. The EPA asserts that fumigants that are not applied under proper conditions pose a much greater risk to workers and to off-site movement. As a result, the EPA is specifying a variety of good agricultural practices (GAPs) that will be required for soil applications of chloropicrin. Some GAPs will be optional for compliance. The following are mandatory GAPs that *must* be followed prior to and during all fumigant applications of chloropicrin.

Soil preparation

- Fields must be clear of crop residue on the surface.
- Trash (any organic or inorganic material) pulled to ends of the field must be covered and sealed with plastic mulch.
- The area to be fumigated should be tilled to a depth of 5–8 in. with no clods greater than the size of a golf ball within the proposed fumigation area.

Soil temperature

- Maximum soil temperature at the depth of injection shall not exceed 90°F at the beginning of application.
- If air temperatures have been above 100°F in any of the three days prior to application, then soil temperature must be measured and recorded in the fumigant management plan (FMP).

Soil moisture

- The soil must be moist 9 in. below the surface using the USDA "feel and appearance" method or by using an instrument capable of directly measuring soil moisture. For more information about the "feel and appearance" method, visit <http://www.mt.nrcs.usda.gov/technical/ecs/agronomy/soilmoisture/index.html>.
- Soil moisture must be measured no more than 48 hours prior to application.
- Moisture must be greater than 75% available soil moisture content.
- When using the "feel and appearance" method, a Florida fine sandy soil should form a weak ball and have a darkened color. For a sandy loam, the soil should also make a weak ribbon between the thumb and forefinger.

Soil sealing

- For broadcast application without a tarp, the soil must be mixed to a depth of at least 3–4 in. to eliminate the chisel traces, and the soil surface

compacted with a cultipacker, ring roller, and roller in combination with the tillage equipment.

- For broadcast application with a tarp, shank or chisel traces must be eliminated prior to laying plastic mulch.
- For bedded applications with tarps, a bed shaper or press sealer must be used to eliminate any chisel or shank traces after fumigant application but prior to laying plastic mulch.

Tarps (plastic mulch) – A written tarp plan must be developed for inclusion in the FMP and must include:

- Establishment of a formal timetable and document procedures for checking and repairing tarps.
- Plans for determining when and how repairs to tarps will be made, and by whom.
- Establishment of a minimum and maximum time after application and minimum hole size within the tarp that will be repaired.
- Equipment used to repair tarps and people responsible for checking and repairing tarps.
- Aeration plans and procedures to follow after tarp perforation but prior to removal or planting.
- Installation of tarps immediately following fumigant application.

Weather conditions

- Before proceeding, wind speed must be a minimum of 2 mph at the start of fumigation or be forecasted to be at least 5 mph during application.
- Fumigant must not be applied if the weather is forecasted to be unfavorable for fumigant application, including the 48-hour buffer zone period after application.
- Fumigant must not be applied if a temperature inversion is forecasted to occur for more than 18 hours of the 48-hour buffer zone period.

- Applicators can find detailed forecasts of expected weather conditions at www.nws.noaa.gov.

Application depth

- For applications without a tarp, the injection point must be a minimum of 10 in. from the nearest soil surface.
- For broadcast and bedded applications with tarps, the injection point should be a minimum of 8 in. from the bed top or nearest soil surface. In bedded applications with tarps, the injection point should not be deeper than the lowest point of the tarp.

Prevention of end row spillage

- Fumigant must not be allowed to discharge from fumigant delivery orifices to the soil surface.
- Any remaining fumigant must be purged from the shanks prior to lifting the rig from the ground.

Shank-applied fumigant calibration, setup, repair, and maintenance of rigs

- Galvanized, PVC, nylon, or aluminum piping must not be used on delivery or soil application equipment.
- Applicators must use brass, carbon steel, or stainless steel fittings.
- Polyethylene tubing, Teflon tubing, or Teflon line braided stainless steel tubing must be used for all low-pressure lines. Any other pressurized lines must be Teflon-lined stainless steel.
- All application systems must include a filter for removing particulates and impurities.
- All fumigant application systems must include a flowmeter or constant pressure system with orifice plates.
- To prevent the backflow of fumigant into the compressed nitrogen gas cylinder, applicators must ensure the product cylinder has at least 200 psi and has a functioning check valve on the cylinder. Applicators should always pressurize

the system with compressed gas prior to opening the fumigant cylinder. Compressed air systems must also have a check valve.

- Before using the fumigation rig for the first time, applicators must change or clean the filter as necessary, check all tubing, pressurize the system using compressed gas, and check for leaks using a soap solution.
- When fumigation is complete, applicators must close all valves and blow residual fumigant from the system using compressed air or gas.
- At the end of application, all fumigant cylinders must be disconnected from the rig.
- At the end of the season, all ends of open lines should be sealed with tape to prevent dirt or insect entry.

Additional GAPs for drip-applied calibration, setup, repair, and maintenance of application rigging

- Fumigant must be metered into the line and mixed using a centrifugal pump or static mixer.
- Irrigation lines must be checked for any leaks and repaired.
- The system must contain a check valve and low-pressure drain to prevent water source contamination; a check valve to prevent backflow into the fumigant container; a valve to prevent fumigant application when the water source is automatically or manually shut down; and functional interlocking controls that automatically shut off the fumigant injection if water flow decreases or stops, affecting the fumigant application.
- The site of injection must be as close as possible to the site being fumigated.
- The system must be flushed after fumigant application. The total volume of water must be enough to completely remove any excess fumigant from the lines.

New Handler Protections for Chloropicrin

For worker protection, the EPA has clarified the definition of a handler and increased some protection requirements when a worker is conducting a handling activity. The EPA has made these changes to allow for better worker protection as part of its occupational risk mitigation program.

Handler definition

The following activities are prohibited in the application block or surrounding area unless those conducting the activities are adequately trained and PPE-equipped as handlers:

- Participating in fumigant application, including supervising, tractor driving, loading, shoveling, etc.
- Using devices to take air samples.
- Cleaning up fumigant spills.
- Handling or disposing of fumigant containers.
- Cleaning, adjusting, or repairing parts of fumigant machinery.
- Installing, repairing, or operating irrigation equipment in the application block or the buffer zone during the buffer zone period.
- Entering the buffer zone during the buffer zone period to perform in-field tasks.
- Repairing, monitoring, or installing plastic mulch tarps.
- Monitoring fumigant air concentrations outside the perimeter of the buffer zone.

Handler requirements

- For all shank applications from the start of fumigant application to the finish, the certified applicator must be present at the fumigation site and must directly supervise all persons performing handling activities.

- After application, the certified applicator must have provided in writing (if leaving the site) to WPS-trained handlers the procedures needed for work to continue (including monitoring and emergency procedures).
- At least two WPS-trained handlers must be on site during all handling activities, including fumigant monitoring.

Respiratory protection

- When respirators are required, a full-face respirator with an organic vapor cartridge must be used.
- If a handler experiences sensory irritation (tearing, burning of the eyes or nose):
 - An air-purifying respirator must be worn by all handlers who remain in the application block and surrounding buffer zone, or
 - Operations must cease and handlers not wearing respiratory protection must leave the fumigation area and buffer zone.
- Respirators can be removed (or operations resumed) if two consecutive breathing zone samples taken at the handling site at least 15 minutes apart show levels of chloropicrin have decreased to less than 0.15 ppm with no worker sensory irritation.
- When respirators are worn, air samples must be taken every two hours.
 - If at any time a handler experiences sensory irritation when wearing a respirator or air samples are equal to or above 1.5 ppm for chloropicrin, all work must cease and handlers must be removed from the fumigation area and the buffer zone. If operations cease, emergency procedures outlined in the fumigant management plan (FMP) must be implemented.
 - Handlers can resume activities without a respirator after two consecutive samples taken 15 minutes apart indicate levels less

than 0.15 ppm for chloropicrin. While collecting samples, the sampler must wear a respirator.

- Handlers can resume activities with a respirator if chloropicrin levels are below 1.5 ppm from two samples taken 15 minutes apart, if no handler experiences sensory irritation, and if the cartridges have been changed.

Respiratory fit testing, training, and medical certification

- If the certified applicator (fumigator) intends to cease operations and exit the field at the moment the respirator-triggering sensory irritation is experienced, then no fit testing, medical qualification, and OSHA-approved training is necessary for workers who will not perform tasks requiring respirators.
- If handlers will be expected to continue work after sensory irritation is triggered, then respirator fit testing in accordance with OSHA requirements is required *before* handlers can be asked to wear a respirator.
- OSHA-approved training instructs handlers about how to use a respirator and how to work safely while wearing a respirator.
- All handlers expected to use a respirator must be examined and medically certified by a qualified medical practitioner to ensure their physical ability to safely wear a respirator.
 - Response to a simple questionnaire may be all that is required.
 - If any potential health problems are recognized, a medical exam may be necessary.
- All respiratory fit testing, training, and medical certification requirements must be completed annually.

Tarp perforation and removal

- Tarps cannot be perforated until five days after fumigation has been completed.
- Tarps cannot be removed until two hours after perforation, provided two air samples indicate that the level of chloropicrin is less than 0.15 ppm (or less than 1.5 ppm if respirator protection is to be used).
- If tarps are left intact, planting can occur immediately after perforation, provided 14 days has elapsed since fumigation.
- If planting occurs within 14 days of fumigation, it cannot occur until 48 hours after tarp perforation.
- Tarp perforation must be done by mechanical means unless the field is less than one acre, or unless tarp perforation is done during flood prevention activities or at the beginning of each row.
- Each broadcast tarp panel must be perforated using a lengthwise cut.
- Broadcast tarps can be removed prior to five days if adverse weather conditions will affect the integrity of the tarp, provided at least 48 hours has passed since fumigation and the buffer zone is extended an additional 24 hours.

Extended Worker Reentry Restrictions for Chloropicrin

In addition to other regulations, the EPA has made changes to reentry time after fumigation to help reduce potential worker exposure levels.

Entry restrictions

- While the buffer period will end 48 hours after the conclusion of fumigation, the reentry period extends 120 hours after the conclusion of fumigant application. Only a correctly trained and PPE-equipped handler may enter the area prior to the end of the 120-hour reentry period.

- After tarps are perforated and removed, the entry restriction applies if tarp removal is completed less than 14 days after application. Workers may enter at any time if tarps have been perforated for at least 48 hours.

Fumigant Management Plan (FMP) for Chloropicrin

To help ensure that applicators and/or owner/operators are adhering to all regulations, the EPA is requiring that a fumigant management plan (FMP) be prepared prior to fumigation and any deviations from the plan be noted in an after-action report. The FMP will consist of many pages of information as it relates to the fumigant application. A template for the plan has been produced by the EPA, but growers are encouraged to create their own copies based off of the template so that common information between fumigation applications does not have to be reentered. An FMP must be completed for each day of a fumigation event. Some changes to the FMP are expected once the new fumigant labels have been released.

Fumigant management plans (FMPs)

The EPA has decided potential risks to workers and bystanders can only be reduced if certified applicators are required to carefully plan and document in writing each major element of *each day's* fumigation activity. Each major information element within an FMP includes:

- General site and applicator information
- Application procedures
- Description of how the fumigator plans to comply with label requirements for GAPs, buffer zones, air monitoring, worker protection, posting, and providing notification to the state or tribal lead agency
- Plans for communication between the applicator and others involved in the fumigation, documentation, and handling of emergency situations

Prior to each day's fumigation, the certified applicator must be able to provide a copy of the FMP

to handlers and workers in adjacent areas upon request. In the event of an emergency, the FMP must also be available to first responders. Each day's FMP must be signed, dated, and archived for at least two years. The EPA has created a template for FMPs that can be used by the grower to characterize *each day's* fumigation activity. The FMP template created by the EPA can be found at the end of the methyl bromide docket located at the following link:
<http://www.regulations.gov/search/Regs/home.html#documentDetail?D=EPA-HQ-OPP-2005-0123-0716>

Overview of New Buffer Zone Regulations for Chloropicrin

The EPA has decided that requiring a buffer zone to surround a treated field after fumigant application is a major component of reducing bystander exposure to fumigant gases. A buffer zone is defined as the area measured inwardly from the property line of adjacent, non-grower-owned property to the edge of the fumigant treated area within the field. In essence, the buffer zone distance represents the interior point on the field periphery where fumigant treatment can legally occur. After revisions to fumigant labels are made in 2011, buffer zone restrictions will be a prerequisite for field applications of all soil fumigant products. Some fumigants already have buffer zone requirements. For example, all soil fumigants containing 1,3-dichloropropene (Telone®) cannot be applied within 100 ft of an occupied structure, such as a school, hospital, business, or residence. For chloropicrin, buffer zone distances will be determined based on how the fumigant is applied (shank, drip, in bed, broadcast, tarp, nontarp, type of tarp or plastic mulch used), the number of acres treated per day, the use rate per acre, and other field and environmental conditions.

Buffer zones will remain in effect for 48 hours from the time fumigant delivery within the application block stops. Distance tables, created by the EPA, will be part of the new fumigant labels and will allow calculation of the appropriate buffer zone distances based on the previously reported criteria and parameters. If buffer zones are deemed too large, then growers may choose to use specific "buffer zone reducing credits" to shrink the buffer zone distance

requirement to an acceptable level. Buffer zone reducing credits may include the type of plastic mulch used, soil moisture level, soil organic matter level, and soil temperature.

Buffer zone reentry

- While the buffer zone is in effect (48 hours), all workers who enter and work within the area must be WPS trained and PPE equipped. (In most cases, a respirator will not be required.)

Exemption for transit through the buffer zone

- Access to the buffer zone area must be limited to handlers, although transit through a buffer zone is permitted if done in a vehicle or on a bicycle.
- Bus stops and other places where people wait for public transportation are not allowed within the buffer zone.

Structures under the control of the owner/operator

- Structures include shops, storage areas, housing, etc.
- These structures may not be part of the buffer zone unless the buildings are not occupied during the buffer zone period and the structures do not share a common wall with an occupied structure.

Structures not under the control of the owner/operator

- Structures include houses, garages, storage areas, etc.
- Buffer zones may not include these structures unless written permission is obtained stating that these buildings will not be occupied during the buffer zone period and they do not share a common wall with an occupied structure.
- The occupants may not reenter the areas until the buffer zone period has ended and sensory irritation is not experienced.

Areas not under control of the owner/operator of the application block

- Areas include lawns, play areas, gardens, etc.
- Buffer zones may not include these areas unless written permission is obtained stating that these areas will not be occupied during the buffer zone period.
- The occupants may not reenter the areas until the buffer zone period has ended and sensory irritation is not experienced.

Publicly owned areas not under the control of the owner/operator

- Buffer zones may include publicly owned roads and rights of way as long as the area is not occupied during the buffer zone period, entry by nonhandlers is prohibited, and all local laws and regulations are followed.
- Buffer zones may not include a publicly owned area that has a permanent walking path associated with it unless written permission to use this area in a buffer zone is granted prior to fumigation.
- Buffer zones may include publicly owned or operated areas, such as playgrounds and athletic fields, only if the area is not to be occupied during the buffer zone period and written permission is obtained from the owner/operator.

Difficult-to-evacuate sites

- These include schools (preschool through grade 12), state-licensed day cares, nursing homes, assisted living facilities, hospitals, in-patient clinics, and prisons.
- No fumigant application with a buffer zone greater than 300 ft is permitted within 1/4 of a mile of a difficult-to-evacuate site unless the site is not occupied during the application period and the 36-hour period following the application and written permission is granted.

Agricultural areas not under the control of the owner/operator

- Buffer zones may include other agricultural areas not owned or operated by the applicator if the owner/operator of the area provides written permission stating that the buffer zone will not overlap with any buffer zones in the area and that all personnel will be kept from entering the area until the end of the buffer zone period.

Buffer zone proximity

- A buffer zone may not overlap other buffer zones unless a minimum of 12 hours has elapsed since the end of the first application and the beginning of the second application.
 - If buffer zones overlap, the emergency preparedness and response measures must be implemented if there are homes, businesses, or properties not in control of the fumigator within 300 ft of the buffer zone.

Buffer Zone Distances for Chloropicrin

The EPA has decided that the use of buffer zones after fumigant application is a major component of reducing bystander exposure. Buffer zones will have some flexibility based on the application type, the area treated, the rate used, and field and environmental conditions. It is the EPA's assessment that bystanders do not have the necessary information to recognize exposure to fumigants. Buffer zones are therefore one part of the equation for bystander risk mitigation.

A buffer zone will be a distance from the edge of the fumigated area to be determined by the previously mentioned factors. The buffer zone will last, in most cases, 48 hours from the conclusion of fumigation. Tables have been created by the EPA to determine the buffer zone distance.

The buffer zone tables located at the link below reflect the raw numbers that may be modified if the application meets the qualifications of buffer zone reduction credits. The full buffer zone tables can be

found at

<http://www.regulations.gov/search/Regs/home.html#documentDetail?D=EPA-HQ-OPP-2005-0123-0716>

Buffer Zone Reduction Credits for Chloropicrin

The EPA has decided that the use of buffer zones after fumigant application is a major component of reducing bystander exposure. The EPA has provided some flexibility to adjust buffer zone distances based on changes made to the method of fumigant application, the area treated per day, the rate used, and changes to field and environmental conditions. It is the EPA's assessment that bystanders do not have the necessary information to recognize exposure to fumigants. Buffer zones are therefore considered an integral component of reducing bystander risk. The EPA has created individual look-up tables based on number of acres treated per day and the amount of active ingredient of the fumigant applied per acre. These tables will allow applicators to determine the required buffer zone distance. Applicators must select the appropriate buffer zone table that best describes their application method (tarp, nontarp, drip, shank, etc.). The applicator may be able to take advantage of the following buffer zone reducing credits, which could significantly reduce buffer zone distance requirements.

High-barrier tarps (30%–60%)

- While a standardized test has yet to be accepted by the EPA, some high-barrier tarps will allow for a reduction in the buffer zone distances.
- One group will allow for a 30% reduction in the buffer zone distance. This includes the Canslit[®] Heatstrip Silver and the Canslit[®] Metalized films.
- The second group will allow for a 60% reduction in buffer zone distances. This includes Olefinas[®] Embossed VIF, Klerks[®] VIF, Pliant[®] Blockade, Bromostop (1.38 mil), Eval/Mitsui[®] TIF (1.38 mil), Hytiblock[®] 7 black (1.25 mil), Pliant[®] XL Black Blockade (1.25 mil), Hytibar (1.5 mil), and IPM Clear VIF (1.38 mil).

- Please check with your local representative, as these lists may be changing as the EPA determines a standardization process.

Soil conditions (10%–30%)

- A 10% reduction in buffer zone distance will be available for soils with an organic matter of 1%–2%.
- A 20% reduction in buffer zone distance will be available for soils with an organic matter of 2%–3%.
- A 30% reduction in buffer zone distance will be available for soils with an organic matter of 3% or greater.
- A 10% reduction in buffer zone distance for soils with a clay content of 27% or greater.

Soil temperature (10%)

- A 10% reduction in buffer zone distances will be available if the soil temperature is less than 50°F when measured 3 in. deep in the soil.

Potassium thiosulfate (KTS) and/or a water seal (15%)

- The use of KTS applied over the top of plastic mulch in 0.25–0.5 in. of water will allow for a 15% reduction in buffer zone distances.
- The use of 0.25–0.5 in. of water applied over the top of plastic mulch as a water seal will allow for a 15% reduction in buffer zone distances.

Buffer zone credit cap (80%)

- When taking into account all buffer zone credits, a maximum reduction of the buffer zone distance will be 80%.
- For example, a high-barrier tarp such as Pliant Blockade (60%) plus 3.5% organic matter content of the soil (30%) would equal a 90% reduction in buffer zone distance, but this would be capped at an 80% reduction in buffer zone distance.

Conclusion

New rules and regulations within REDs will have significant impact on use of fumigants in Florida. Growers, applicators, and owner/operators will accept many new responsibilities and reporting requirements prior to use of a soil fumigant. Clearly, an increased awareness of worker safety and training will be an integral component to fumigant application.