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# Soil Fumigants — Risk Mitigation Measures for Reregistration

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Olson E. 2010. Soil fumigants—risk mitigation measures for reregistration. In: Riley LE, Pinto JR, Dumroese RK, technical coordinators. National Proceedings: Forest and Conservation Nursery Associations—2009. Proc. RMRS-P-62. Fort Collins, CO: USDA Forest Service, Rocky Mountain Research Station: 77-81. Online: [http://www.fs.fed.us/rm/pubs/rmrs\\_p062.html](http://www.fs.fed.us/rm/pubs/rmrs_p062.html).

**Abstract:** The US Environmental Protection Agency is requiring important new safety measures for soil fumigant pesticides to increase protections for agricultural workers and bystanders, that is, people who live, work, or otherwise spend time near fields that are fumigated. These measures are included in Amended Reregistration Eligibility Decisions for the soil fumigants chloropicrin, dazomet, metam sodium/potassium (including methyl isothiocyanate or MITC), methyl bromide.

**Keywords:** fumigant management plans, risk mitigation measures, restricted use pesticides

## Soil Fumigant Amended Reregistration Eligibility Decisions

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In May 2009, after consulting with stakeholders and obtaining extensive public input, the US Environmental Protection Agency (EPA) issued final new safety measures for soil fumigant pesticides to increase protections for agricultural workers and bystanders. Implemented during the next 2 years, these measures will work together to establish a baseline for safe use of the soil fumigants throughout the United States, reducing fumigant exposures and significantly improving safety.

Many of the new safety measures were announced in July 2008 when EPA issued risk management Reregistration Eligibility Decisions (REDs) for soil fumigants. During the past year, the agency took significant public comment on implementation of these measures, including public meetings and visits with many agricultural, farm worker, and public health constituents. In the May 2009 Amended REDs, all measures to reduce risks are still required; some aspects of these measures, however, have been adjusted based on input from stakeholders and on new scientific data that reduce the uncertainties in the Agency's assessments and improved information on certain technological capabilities. These modifications, summarized in Table 1 and discussed in detail in the 2009 Amended REDs, will achieve the same level of protection for people potentially exposed to the fumigants, while resulting in greater compliance and fewer impacts on the benefits of soil fumigant use.

## Risk Mitigation Measures for Soil Fumigants

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EPA is requiring a suite of complementary mitigation measures to protect handlers, reentry workers, and bystanders from risks resulting from exposure to the soil fumigant pesticides. These measures are designed to work together to address all risks, but focus on the acute human inhalation risks that have been identified in the revised risk assessments for these fumigants.

Most of the measures summarized here apply to all of the soil fumigants (for example, fumigant management plans). However, some measures are specific to individual fumigants (for example, buffer distances).

**Table 1.** Modifications from 2008 to 2009 Amended Soil Fumigant REDs.

Mitigation	2008 REDs	2009 Amended REDs
Buffers	Buffer zones based on available data	- New chloropicrin data support smaller buffers and increased confidence in safety - New dazomet data support larger buffers
Buffer Credits	Credits allowed based on available data	New data support more credits
Rights-of-Way	Permission from local authorities must be granted if buffers extend onto rights-of-way	Permission from local authorities is only required when sidewalk is present
Buffer Overlap	Buffers may not overlap	Buffers may overlap; separate applications by 12 hours
0.4 km (0.25 mi) Restriction	0.4 km (0.25 mi) restriction around hard-to-evacuate areas including day care centers, nursing homes, prisons	Maintain 0.4 km (0.25 mi) restriction but allow a reduced restricted area of 0.2 km (0.14 mi) for applications with smaller buffers (less than 91 m [300 ft])
Respiratory Protection	Required monitoring devices to trigger additional measures	- Allow sensory irritation properties to trigger additional measures for MITC and chloropicrin - Device required for methyl bromide formulations with <20% chloropicrin
Emergency Response and Preparedness	Neighbors must be provided with information or buffer zones must be monitored every 1 to 2 hours over 48 hours with monitoring devices	- Same basic measures - Monitoring is required only during peak emission times of the day; irritation acceptable trigger for MITC and chloropicrin in lieu of devices; methyl bromide requires devices

Changes in mitigation measures include:

— Buffers

- Size
- Posting
- Restrictions on buffer overlap
- Restrictions to encroachment on adjacent properties
- Sensitive area restriction
- Improved use practices
- Tarp cutting and removal restrictions
- Worker reentry restrictions
- Use site and rate restrictions
- Fumigant handler respirator protections
- Best management practices

To ensure safety and enhance compliance and enforcement, additional requirements include:

— Planning

- Fumigant management plans
- Emergency preparedness and response measures
- First responder outreach
- Notice to state lead agencies
- Community outreach programs

— Training

- Applicators supervising fumigations
- Handler safety materials
- Restricted use classification

## Buffer Zones

EPA is requiring fumigant users to establish a buffer zone around treated fields to reduce risks from acute inhalation exposure to bystanders. A buffer zone provides distance between the application site (that is, edge of field) and bystanders, allowing airborne residues to

disperse before reaching the bystanders. This buffer will reduce the chances that air concentrations where bystanders are located will cause acute adverse health effects.

EPA has selected buffer distances that will protect bystanders from exposures that could cause adverse effects, but that are not so great as to eliminate benefits of soil fumigant use. The size of the buffer zones is based on the following factors: application rate; field size; application equipment and methods; and emission-control measures (for example, tarps).

Buffer zone distances are scenario-based using applicable site conditions, and will be provided in look-up tables on product labels. EPA is also giving “credits” to encourage users to employ practices that reduce emissions (for example, use of high barrier tarps). Credits will reduce buffer distances. Some credits will also be available for site conditions that reduce emissions (for example, high organic or clay content of soils).

## Posting Requirements

For buffer zones to be effective as risk mitigation, bystanders need to be informed about the location and timing of the fumigation to ensure they do not enter areas designated as part of the buffer zone. EPA is requiring that buffer zones be posted at usual points of entry and along likely routes of approach to the buffer unless: 1) a physical barrier prevents access to the buffer; or 2) all of the area within 91 m (300 ft) of the buffer is under the control of the owner/operator.

The signs must include a “do not walk” symbol, fumigant product name, and contact information for the fumigator.

## Agricultural Worker Protections

Persons engaged in any of a number of activities that are part of the fumigation process are considered “handlers.” Handler activities include operating fumigation equipment, assisting in the application of the fumigant, monitoring fumigant air concentrations, and installing, repairing, perforating, and removing tarps.

## Respiratory Protection

Many current labels require handlers to use respirators when air concentrations in the area where they are working reach certain action levels, but do not require monitoring to determine if the action levels have been reached. New labels will require handlers to either stop work or put on respirators if they experience sensory irritation.

## Tarp Perforation and Removal

Fumigant gases become trapped under tarps and can be released when the tarp is perforated (that is, cut, punched, poked) and removed (for application methods in which tarps are removed before planting). Handlers perforating and removing tarps may be exposed to air concentrations of concern. To reduce these exposures, the EPA is requiring the following: 1) a minimum interval of 5 days between application and tarp perforation; 2) a minimum interval of 2 hours between perforation and tarp removal; 3) that handlers stop work or use respiratory protection if irritation is detected; and 4) use of mechanical devices (for example, using all-terrain vehicles with cutting implements attached) with few exceptions.

## Entry-Restricted Period

Current labels allow worker reentry into fumigated fields 2 to 5 days after applications are complete. There is, however, concern for risks to workers reentering even after 48 hours. Stakeholder comments indicate that reentry for non-handler tasks is generally not needed for several days after the application is complete. EPA is extending the time that agricultural workers (that is, non-handlers) are prohibited from entering the treated area. The entry-prohibited period depends on the method of application, but generally the minimum period for worker reentry will be 5 days or until tarps are perforated and removed.

## Applicator and Handler Training Programs

EPA is requiring fumigant registrants to develop and implement training programs for applicators in charge of soil fumigations on proper use and good agricultural practices so these applicators are better prepared to effectively manage fumigant operations. The registrants also must prepare and disseminate training information and materials for fumigant handlers (those working under the supervision of the certified applicator in charge of fumigations). Providing safety information to other fumigant handlers will help them understand and adhere to practices that will protect them from risks of exposure. The training materials must include elements designed to educate workers regarding work practices that can reduce exposure to fumigants, and thereby improve safety for workers and bystanders.

## Good Agricultural Practices

Current fumigant labels recommend practices that help reduce off-gassing and improve the safety and effectiveness of applications. The EPA has determined that including certain practices on labels as requirements rather than recommendations will minimize inhalation and other risks from fumigant applications. Several fumigant products already incorporate some of these measures on their labels. Examples of good agricultural practices include proper soil preparation/tilling, ensuring optimal soil moisture and temperature, appropriate use of sealing techniques, equipment calibration, and weather criteria.

## Application Method, Practice, and Rate Restrictions

The EPA is restricting certain fumigant application methods and practices for which data are not currently available to determine

appropriate protections, or that lead to risks that are otherwise difficult to address. These include certain untarped applications for some fumigants. The agency is also lowering maximum application rates to reflect those rates needed for effective use, thereby reducing the potential for inhalation exposure and risk.

## Restricted Use Pesticide Classification

All soil fumigant products containing methyl bromide, 1, 3-dichloropropene, and chloropicrin are currently restricted use pesticides, but many soil fumigant products containing metam sodium/potassium and dazomet are not restricted use pesticides. The EPA has determined that all of the soil fumigants undergoing reregistration meet the criteria for restricted use. Therefore, the agency will reclassify metam sodium/potassium and dazomet as restricted use pesticides.

## Site-Specific Fumigant Management Plans

Soil fumigations are complex processes involving specialized equipment to properly apply volatile and toxic pesticides. EPA's risk mitigation allows for site-specific decisions to address the specific conditions where the fumigant is applied. To address this complexity and flexibility, EPA is requiring that fumigant users prepare a written, site-specific fumigant management plan before fumigations begin. Written plans and procedures for safe and effective applications will help prevent accidents and misuse and will capture emergency response plans and steps to take in case an accident occurs.

Fumigation management plans (FMPs) will be a resource for compliance assurance; FMPs will require fumigators to state how they are complying with label requirements. FMPs will help ensure fumigators successfully plan all aspects of a safe fumigation, and will be an important tool for federal, state, tribal, and local officials to verify compliance with labeling.

Elements that must be included in soil FMPs are: general site information; applicator information; application procedures; measurements taken to verify compliance with good application practices; how buffers were determined; worker protection information; procedures for air monitoring; posting procedures; documentation of training of applicators supervising fumigations; procedures for communication among key parties, hazard communication, and record keeping; site-specific response and management activities; emergency plans; procedures for controlling fumigant releases in case of problems during or after the application.

The certified applicator supervising the fumigation must verify, in writing, that the FMP is current and accurate before beginning the fumigation. A post-fumigation summary report describing any deviations that may have occurred from the FMP will also be required within 30 days of the end of the application. The fumigator and the owner/operator of the fumigated field must keep the FMP and post-fumigation summary report for 2 years and make them available upon request to federal, state, tribal, and local enforcement officials.

## Emergency Preparedness and Response Requirements

Although buffers and other mitigation will prevent many future incidents, it is likely that some incidents will still occur due to accidents, errors, and/or unforeseen weather conditions. Early detection and appropriate response to accidental chemical releases are effective means of reducing risk. Preparedness for these types of situations is an important part of the suite of measures necessary to avoid risks posed by fumigants.

### First Responder Education

EPA is requiring registrants to provide training information to first responders in high fumigant use areas. These measures will ensure that emergency responders are prepared to effectively identify and respond to fumigant exposure incidents.

### Site-Specific Response and Management Activities

EPA is requiring site-specific measures in areas where bystanders may be close to fumigant buffer zones. Fumigators may choose either to monitor the buffer perimeter or to provide emergency response information directly to neighbors. If site-specific measures are required, and the fumigator chooses to monitor, the emergency response plan stated in the FMP must be implemented if the persons that are monitoring experience sensory irritation. This monitoring must be done during the full buffer zone time period at times when the greatest potential exists for fumigants to move off-site.

If the fumigator chooses instead to provide emergency response information directly to neighbors, the certified applicator supervising the fumigation, or someone under his/her direct supervision, must ensure that nearby residents and business owners/operators have been provided with the response information at least 1 week prior to fumigant application. The method for distributing information to neighbors must be described in the FMP.

### Compliance Assistance and Assurance Measures

Assuring compliance with new label requirements is an important part of the package of mitigation measures. Some states have mechanisms in place to obtain information needed to assist and assure compliance with new fumigant requirements. Therefore, in states that wish to receive this information, fumigators must notify State and Tribal Lead Agencies for pesticide enforcement about applications they plan to conduct. This information will aid those states in planning compliance assurance activities. EPA will work with all the states to amend their cooperative agreements with the Agency to include strategies for assuring compliance with new fumigant labels. States that do not choose to receive notification will need to document in their cooperative agreements their methods of identifying fumigant application periods and locations.

### Community Outreach and Education Programs

EPA is requiring fumigant registrants to develop and implement community outreach programs to ensure that information about fumigants and safety is available within communities where soil fumigation occurs. Outreach and information will address the risk of bystander exposure by educating community members about fumigants, buffer zones, how to recognize early signs of fumigant exposure, and how to respond appropriately in case of an incident.

**Table 2.** Implementation schedule for soil fumigant risk mitigation measures.

Risk Mitigation Measure	Currently	2010	2011
Restricted Use (methyl bromide and chloropicrin only)	■	●	●
New Good Agricultural Practices		●	●
Rate reductions		●	●
Use site limitations		●	●
New handler protections		●	●
Tarp cutting and removal restrictions		●	●
Extended worker reentry restrictions		●	●
Training information for workers		●	●
Fumigant management plans		○	●
First responder and community outreach		○	●
Applicator training		○	●
Compliance assistance and assurance measures		○	●
Restrictions on applications near sensitive areas			●
Buffer zones around all occupied sites			●
Buffer credits for best practices			●
Buffer posting			●
Buffer overlap prohibitions			●
Emergency preparedness measures			●

■ = applies to some chemicals      ○ = under development      ● = adopt completely

## Next Steps \_\_\_\_\_

### Implement Fumigant Mitigation Measures

To achieve new protections, EPA is moving expeditiously to implement the mitigation measures in the soil fumigant Amended REDs. As indicated in the Timeline for Next Steps and Table 2, many mitigation measures will appear on fumigant product labels by the 2010 growing season, and all measures will be implemented no later than 2011. EPA will continue to work closely with stakeholders to ensure that they understand the new requirements and how they will be phased in.

### Registration Review

A substantial amount of research is currently underway, or is expected to begin in the near term, to address current data gaps and refine understanding of factors that affect fumigant emissions. Additionally, new technologies to reduce emissions are emerging. EPA plans to move the soil fumigants forward from 2017 to 2013 in Registration Review. This will allow EPA to consider new data and technologies sooner, determine whether the mitigation included in this decision is effectively addressing the risks as EPA believes it will, and to include other soil fumigants that are not part of the current review.

## Timeline for Next Steps \_\_\_\_\_

Summer 2009: EPA sends letters to fumigant registrants outlining label schedule.

Fall 2009: Registrants submit revised labels to EPA.

2010: EPA reviews and approves new soil fumigant labels before the growing season, implementing most measures (except those related to buffer zones) to achieve improved protections.

2011: EPA implements remaining measures relating to buffer zones to gain full protections.

2013: EPA begins reevaluating all soil fumigants under the Registration Review program.

## EPA Soil Fumigant Contacts \_\_\_\_\_

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