



**US Environmental Protection Agency
Office of Pesticide Programs**

RED Fact Sheet: Chloropicrin

July 10, 2008

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Pesticide Reregistration

All pesticides sold or distributed in the United States must be registered by EPA, based on scientific studies showing that they can be used without posing unreasonable risks to people or the environment. Because of advances in scientific knowledge, the law requires that pesticides first registered before November 1, 1984, be reregistered to ensure that they meet today's more stringent standards.

In evaluating pesticides for reregistration, EPA obtains and reviews a complete set of studies from pesticide producers that describe the human health and environmental effects of each pesticide. The Agency develops any mitigation measures or regulatory controls needed to effectively reduce each pesticide's risks. EPA then reregisters pesticides that meet current human health and safety standards and can be used without posing unreasonable risks to human health and the environment.

When a pesticide is eligible for reregistration, EPA explains the basis for its decision in a Reregistration Eligibility Decision (RED) document. This fact sheet summarizes the information in the RED document for the pesticide chloropicrin, case number 0040.

Concurrent to EPA's review of the soil fumigant uses of chloropicrin, EPA assessed the risks and developed risk management decisions for four other soil fumigant pesticides, including methyl bromide, dazomet, metam sodium/metam potassium, and a new active ingredient, iodomethane. Risks of a fifth soil fumigant, 1,3-dichloropropene (1,3-D), were also analyzed along with the other soil fumigants for comparative purposes. The RED for 1,3-D was completed in 1998. The Agency evaluated these soil fumigants concurrently to ensure that human health risk assessment approaches are consistent, and that risk tradeoffs and economic outcomes were considered appropriately in reaching risk management decisions. This review is part of EPA's program to ensure that all pesticides meet current health and safety standards.

Regulatory History

- First registered in the U.S. in 1975
- A Registration Standard was issued in 1982

Uses

- Chloropicrin is a broad-spectrum fumigant chemical that can be used as an antimicrobial, fungicide, herbicide, insecticide, and nematicide.
- Chloropicrin is used as a pre-plant soil fumigant at agricultural sites, tree replant sites, and greenhouses; a warning agent with other soil fumigants including methyl bromide and iodomethane, a warning agent in residential structures before sulfuryl fluoride fumigations; and an antimicrobial for remedial wood treatment.
- As a pre-plant soil fumigant chloropicrin is either injected (e.g., by shank) into the soil or applied via drip irrigation. These applications can either be tarped or untarped.
- For the orchard use, chloropicrin is used in existing orchards for tree replant purposes in small treated areas (10' x 10'). It is injected at least 18 inches into the soil using a replant wand and the soil is compacted after the application wand is withdrawn.
- When used as a warning agent prior to sulfuryl fluoride residential structure fumigations, a tent must first be put up around the structure. Chloropicrin is placed in the center of the structure 5-10 minutes before sulfuryl fluoride is introduced.
- For remedial wood treatment, chloropicrin is either poured/injected or applied with encapsulated vials into pre-drilled holes. For utility pole treatment, holes are drilled at a 45 degree angle and chloropicrin is poured/injected or applied with encapsulated vials into all of the holes. After the chloropicrin has been applied, the holes are immediately plugged
- Approximately 10 million pounds of chloropicrin are used annually for pre-plant soil fumigations.

Health Effects & Risks

Health Effects

- Chloropicrin can cause eye, nose, throat, and upper respiratory irritation. Results from a chloropicrin human sensory irritation study indicate that eye irritation is the most sensitive effect.
- The Agency selected a reversible acute endpoint using a human sensory irritation study with a bench mark concentration level (BMCL₁₀) of 0.073 parts per million (ppm). At this level EPA does not expect eye or nose irritation, upper respiratory changes, or any other health effects. Most of the study participants detected chloropicrin within 20-30 minutes at 0.15 ppm. This level corresponds to mild irritation without leading to more severe irritation or respiratory effects. In addition, the study shows that persons exposed to 0.15 ppm of chloropicrin, did not experience irritation effects 1 hour after the exposure ended, and also no effects were seen the following day.

Risks from Pre-Plant Soil Use

- EPA has identified acute inhalation as the main risk of concern for handlers (including persons involved in the application, and also persons involved in tarp perforation and removal activities), workers, and bystanders.
- Monitoring and modeling data indicate that there can be risks of concern associated with chloropicrin use at a broad range of distances from treated fields, depending on application method, emission control methods employed, application rate, and size of the area treated.
- Incidents from chloropicrin and other fumigants have occurred involving handlers, workers and bystanders.
- Bystander incidents from chloropicrin and other fumigants have occurred to people who were located close to fields and up to several thousand feet from the fumigated field.

Risks from Structural Warning Agent Use

- As with other uses, EPA has risk concerns for inhalation risks to handlers.
- EPA does not have risk concerns for bystanders for this use.

Risks from Antimicrobial Remedial Wood Treatment Use

- EPA has identified acute inhalation as the main risk of concern for handlers and workers, and bystanders near the application.

Ecological Effects & Risks

- EPA's ecological risk assessment indicates some risk concerns for non-target organisms.
- Chloropicrin is highly volatile and is a gas at room temperature. Inhalation is the major exposure pathway for terrestrial animals.
- Risks to mammals based on refined air modeling do not exceed the Agency's level of concern (LOC); however, risks to birds could not be quantified in absence of inhalation toxicity data.
- Chloropicrin is highly soluble in water and has low adsorption in soil, characteristics in common with chemicals that have been detected in groundwater. Chloropicrin can potentially leach into groundwater or reach surface water as a result of heavy rainfall events. However, its high vapor pressure and high Henry's Law Constant indicate that volatilization is the most important route of dissipation. Chloropicrin is usually applied under tarps, which reduces potential for movement to water.
- Risks to aquatic organisms exceed EPA's acute LOCs for some fish and invertebrate scenarios. Chronic risks to aquatic organisms were not estimated due to lack of chronic data, however, due to its volatility, chronic exposure to chloropicrin is unlikely.

- There are several uncertainties in estimating ecological effects of chloropicrin due to limited toxicity data and the limitations of exposure models and crop scenarios.

Benefits

Due to the broad range of pests controlled, soil fumigants are used in production of a wide variety of crops and provide high benefits for many growers. Chloropicrin has benefits both as a methyl bromide alternative and as a warning agent to make people aware of potential exposures to other fumigants such as methyl bromide and sulfuryl fluoride.

Risk Mitigation for Soil Uses

EPA has identified several measures which will work together to protect fumigant handlers, reentry workers, and bystanders from risks resulting from exposure to chloropicrin. These are summarized below.

- **Buffer Zones:** Buffer zones, of varying sizes based on application method, application rate, application block size, and emission control measures are required. Buffer zones will be in effect from the time the fumigation begins until 48 hours following the application.
- **Posting:** 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 such as a fence prevents access to the buffer, or (2) all of the area within 300' of the buffer is under the control of the owner/operator. The posting requirement is intended to prevent passersby from entering a buffer zone.
- **Worker Protections:** The following additional measures will be required to protect those involved in handler activities.

Respiratory Protection – New labels will require air monitoring at regular intervals. If concentrations detected are above action levels on labels, handlers must wear respirators.

Tarp Perforation and Removal –

- tarps cannot be perforated (cut/punched) until a minimum of 5 days (120 hours) have passed after the fumigant application is complete;
- a minimum interval of 24 hours must pass between perforation and tarp removal;
- use of respiratory protection is required for tarp perforation if concentrations exceed labeled action levels; and
- use of mechanical devices (e.g., using all-terrain vehicles with cutting implements attached) is required.

Entry - Only properly trained and equipped handlers can be in the field during treatment and for 5 days after the application is complete.

- **Good Agricultural Practices (GAPs):** Mandatory GAPs must be followed during all soil applications. GAPs specify appropriate weather conditions, injection depth, soil sealing, soil temperature, air temperature, soil moisture, soil preparation, prevention of end row spillage, flushing of drip irrigation lines, and calibration, set-up, repair and maintenance of application equipment.
- **Fumigant Management Plans (FMPs):** The certified applicator supervising the application must verify that a site-specific FMP exists for each application block which includes site information, a map of the treated field, authorized personnel, application procedures, posting plans, and emergency procedures. Within 30 days of completing the application portion of the fumigation process, the certified applicator supervising the application must complete a post fumigation application summary that describes any deviations from the FMP that occurred, measurements taken to comply with GAPs, as well as any complaints and/or incidents that have been reported to him/her. The summary must include the actual date of the application, application rate, and size of application block fumigated.
- **Emergency Preparedness and Response:** The Agency is requiring emergency preparedness measures at the community level in the form of information and education for first responders, and site-specific response and management activities. These measures will ensure early detection and quick response to situations as they arise.
- **Notice to State and Tribal Lead Agencies:** Assuring compliance with new label requirements is an important part of the package of mitigation measures. Therefore, before the application, fumigators must notify State and Tribal Lead Agencies for pesticide enforcement about applications they plan to conduct. This information will aid states in planning compliance assurance activities.
- **Outreach Program for Communities:** Registrants must disseminate health and safety information to communities, including first responders, in areas where there is high use of chloropicrin and areas with significant interface between communities and fumigated fields.
- **Training Program and Training Materials:** The registrants must develop a training program approved by EPA that provides information on how to correctly apply the fumigant including how

to protect themselves, other handlers and bystanders, how to determine buffer zone distances, how to develop an FMP, and how to determine when weather and other site-specific factors are not favorable for fumigant application.

Other Risk Mitigation

- ***Antimicrobial Remedial Wood Treatment Use:*** EPA is requiring that applicators and other handlers wear an approved respirator at all times when handling chloropicrin during the transfer of the product into vials and during the pouring/injecting of chloropicrin into pre-drilled holes.
- ***Structural Warning Agent Use:*** EPA is requiring respiratory protection for handlers.
- ***Ecological Risks:*** Many of the mitigation measures EPA is requiring to address human health risk, such as GAPS, timing of tarp perforation and removal, and RUP classification, will also reduce potential ecological risks.

Regulatory Conclusion

EPA has concluded that the supported uses of chloropicrin for: 1) pre-plant soil agricultural, greenhouse, and tree replant, 2) warning agent, and 3) antimicrobial remedial wood treatment, are eligible for reregistration provided the mitigation measures discussed above are adopted and labels are amended to implement these measures.

For More Information

Electronic copies of the Chloropicrin RED and all supporting documents are available in Docket #EPA-HQ-OPP-2007-0350 at <http://www.regulations.gov>. For more information about EPA's pesticide reregistration program, the Chloropicrin RED, or reregistration of individual products containing chloropicrin, please contact the Special Review and Reregistration Division (7508C), Office of Pesticide Programs, US EPA, Washington, DC 20460, telephone 703-308-8000.

For information about the health effects of pesticides, or for assistance in recognizing and managing pesticide poisoning symptoms, please contact the National Pesticide Information Center (NPIC). Call toll-free 1-800-858-7378, from 6:30 am to 4:30 am Pacific Time, or 9:30 am to 7:30 pm Eastern Standard Time, seven days a week. The NPIC internet address is <http://npic.orst.edu>.