



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

RED Fact Sheet:

**Methyldithiocarbamate Salts - Metam
Sodium/Potassium and MITC**

July 10, 2008

RED Fact Sheet:
Methyldithiocarbamate Salts (Metam Sodium & Metam Potassium)
and Methyl Isothiocyanate (MITC)
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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 RED document. This fact sheet summarizes the information in the RED document for the pesticides Methyldithiocarbamate Salts, case number 2390, and Methyl Isothiocyanate (MITC), case number 2405.

Concurrent to EPA's review of the soil fumigant uses of metam sodium, metam potassium and methyl isothiocyanate, EPA assessed the risks and developed risk management decisions for four other soil fumigant pesticides, including: chloropicrin, dazomet, methyl bromide, and a new active ingredient, iodomethane. Risks of a fifth soil fumigant, 1,3-dichloropropene (Telone), were also analyzed along with the other soil fumigants for comparative purposes; its risk management decision 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

- Metam potassium was first registered in the United States in 1973 as a fungicide, a bacteriostat, and a microbicide/microbicide in a variety of

commercial and industrial applications. In 1994, the use of metam potassium expanded to include food and feed uses when used as a soil fumigant.

- Metam sodium was first registered in the United States in 1975. Metam sodium is one of the most widely used agricultural pesticides in the United States and is presently registered on food and feed crops.

Uses

- Metam sodium and metam potassium are non-selective soil fumigants with fungicidal, herbicidal, insecticidal, and nematocidal properties. They are dithiocarbamate salts that break down quickly in the environment to the primary toxic degradate, methyl isothiocyanate (MITC). MITC is highly volatile and is responsible for the fumigant properties of metam sodium and metam potassium.
- Metam sodium and metam potassium are used on a wide range of pests including fungi, plants, insects, and nematodes. As an agricultural soil fumigant, it is currently labeled for use on all food, feed, and fiber crops. It also is used pre-plant on turf grass, to control invading plant roots in drains and sewers, and for vegetation control along drained ponds and lakes (in California only).
- Metam sodium, metam potassium, and MITC are all registered as antimicrobial agents to control a number of microbiological pests, including bacteria and fungi. Some uses of metam sodium and metam potassium include on wood poles, in leather processing and in raw cane and sugar processing, as well as in industrial water purification systems. The active ingredient, MITC, has only one registered antimicrobial use on wood poles and pilings.
- There are no residential uses.
- Commonly used pre-plant application rates range from 40 – 320 pounds of active ingredient per acre (lbs a.i./A) in soil fumigant applications. For sewers and drains, the maximum application rate is 0.212 lbs a.i./gallon of solution.
- Metam sodium, metam potassium, and MITC do not require food tolerances; due to the volatility of metam sodium and metam potassium in the environment, no residues on food are expected.
- Currently, most metam sodium, metam potassium and MITC products are not restricted use but will be as a result of the reregistration decision.
- Annual use of metam sodium ranges from 51-55 million pounds and for metam potassium ranges from 1-2 million pounds.

Health Effects & Risks

- Acute inhalation exposures to MITC of 22 ppb or greater for residential bystanders and occupational handlers exceed the Agency's level of concern. Such exposures could cause eye irritation, systemic, or respiratory effects. Eye irritation is protective of other human health effects and acts as a warning sign for potentially more adverse systemic effects.
- Metam Sodium, Metam Potassium and MITC are dermal sensitizers.
- Metam Sodium is in cancer category Group B2 – "probable human carcinogen."
- The Agency currently has no data on MITC carcinogenicity, but data are being required in reregistration.
- In agricultural uses, metam sodium and metam potassium are applied pre-plant and become volatile gases (MITC) shortly after application. Therefore EPA does not anticipate dietary exposure from residues on food or exposure through drinking water.
- Acute exposure to bystanders or fumigant handlers is possible following metam sodium/potassium application due to volatilization and off-site movement of MITC.
- Occupational risks have been identified for handlers exposed to metam sodium and/or metam potassium during the application process and post-application workers and/or reentry workers exposed to MITC.
- Incidents from metam sodium and/or metam potassium and other fumigants have occurred involving handlers, workers and bystanders.
- Bystander incidents from metam sodium and/or metam potassium and other fumigants have occurred to people who were located close to fields and up to several thousand feet from the fumigated field.

Ecological Effects & Risks

- Metam sodium, metam potassium, and MITC are acutely toxic to mammals, birds, aquatic invertebrates and fish.
- Once MITC volatilizes into the atmosphere, it degrades rapidly due to photolysis, thus somewhat limiting exposure to terrestrial organisms. Similarly, exposure to aquatic organisms is limited by MITC's high potential to volatilize from surface water bodies.

Benefits

Due to the broad range of pests controlled, soil fumigants are used in the production of a wide variety of crops and provide high benefits for many growers. Benefits to crop production from metam sodium and metam potassium use accrue either from superior pest control (e.g. tomatoes) or lower production costs (e.g. carrots, onions, peanuts), or both (e.g., cucurbits, peppers, potatoes).

Risk Mitigation

EPA has developed a multi-faceted approach to addressing bystander and handler risk for fumigants. This involves label changes, education of fumigant applicators and handlers, monitoring of fumigant air concentrations, and development of additional data to refine risk assessments. Specific mitigation for bystanders and handlers includes:

- **Removal of Some Uses** – Based on potentially high risk to bystanders, coupled with a lack of indication of high economic benefits, some crop uses are not being reregistered. Those crops eligible for reregistration are listed in the regulatory conclusions section. An additional change in the maximum application rate for pre-plant soil application will be limited to 320 lb/acre.
- **Restricted Use Pesticide (RUP) Classification** – MITC, the byproduct of metam sodium, metam potassium, and dazomet, meets the criteria for restricted use based on human hazard criteria and exposure incidents. All soil fumigant products containing metam sodium or metam potassium will be RUPs.
- **Buffer Zones** – Buffer zones, of varying sizes based on application method, application rate, and 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 Protection Measures:**
 - Respiratory Protection - Handlers exposed to MITC vapors from metam sodium/potassium or MITC applications will either wear respirators or follow an air monitoring program. Additional dermal PPE is required for some handler tasks.
 - 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, use of tarps, 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 fumigant management plan (FMP) exists for each application block, which includes site information, a map of the treated field and adjacent property, 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 FMPs, 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 applications 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 dazomet 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

to the applicators and handlers 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.

- ***Ambient Air Monitoring Program*** – Registrants will develop an air monitoring program in high use areas to evaluate whether ambient air concentrations exceed Levels of Concern (LOC).

Regulatory Conclusion

The Agency has determined the following metam sodium and metam potassium soil fumigant uses are eligible for reregistration and will not pose unreasonable risks or adverse effects to humans or the environment, provided the risk mitigation measures and label changes outlined in this RED are implemented:

Asparagus (nursery production only); artichokes; broccoli, brussel sprouts, cabbage; carrot; cauliflower, celery; cucurbits (cucumber, cantaloupe, honeydew, pumpkin, squash, and watermelon); eggplant; forest seedlings; grape – vineyard replant only; lettuce; mint; nursery stock (fruit seedlings and rose bushes only); oranges; onion; pome fruit (apples and pears) – orchard replant only; stone fruit (apricot, cherry, nectarine, peach, plum and prune) – orchard replant only, ornamentals (floriculture only); peanut; pepper; potato; spinach; strawberries; sweet potato; tobacco; tomatoes; turf (including golf courses).

In addition, (1) metam sodium as a root control agent in sewers and drains, and as an antimicrobial agent to treat wooden poles, timbers, sewage sludge, and animal waste; (2) metam potassium as an antimicrobial agent for treatment of pulp and paper, leather tanning drum, recirculating cooling water systems; and industrial water purification systems; and (3) MITC as an antimicrobial agent to treat wood poles and pilings are eligible for reregistration and will not pose unreasonable risk to humans or the environment, provided the risk mitigation measures and label changes outlined in this RED are implemented.

For More Information

Electronic copies of the pesticides Methyldithiocarbamate Salts and Methyl Isothiocyanate (MITC)

RED and all supporting documents are available in Docket #EPA-HQ-OPP-2005-0125 at <http://www.regulations.gov>. For more information about

EPA's pesticide reregistration program, the Methylthiocarbamate Salts and Methyl Isothiocyanate RED, or reregistration of individual products containing Methylthiocarbamate Salts and Methyl Isothiocyanate, 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>.