

RESTRICTED USE PESTICIDE

Due to inhalation exposure to humans.
For retail sale to and use only by Certified Applicators or persons under their direct supervision and only for those uses covered by the Certified Applicator's certification.



Emulsifiable Soil Fumigant for Preplant Soil Chemigation

For control or suppression of weeds, soil-borne plant pathogens and nematodes in soils to be planted with vegetables (tomatoes, peppers, eggplants), cucurbit crops (cucumber, squash and melons), strawberries, blueberries, field-grown ornamentals, and forest nursery stock where plastic tarp is used for chemigation. For application via raised bed chemigation only.

ACTIVE INGREDIENT:

Dimethyl disulfide..... 93.8%

OTHER INGREDIENTS:..... 6.2%

TOTAL:..... 100.0%

One gallon weighs 8.85 lbs. at 68° F

Keep Out of Reach of Children WARNING / AVISO

Si usted no entiende la etiqueta, busque a alguien para que se la explique a usted en detalle.
(If you do not understand the label, find someone to explain it to you in detail.)

FIRST AID	
IF SWALLOWED:	<ul style="list-style-type: none"> ▪ Call a poison control center or doctor immediately for treatment advice. ▪ Have person sip a glass of water if able to swallow. ▪ Do not induce vomiting unless told to do so by a poison control center or doctor. ▪ Do not give anything by mouth to an unconscious person.
IF INHALED:	<ul style="list-style-type: none"> ▪ Move person to fresh air. ▪ If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably mouth-to-mouth if possible. ▪ Call a poison control center or doctor for treatment advice.
IF ON SKIN OR CLOTHING:	<ul style="list-style-type: none"> ▪ Take off contaminated clothing. ▪ Rinse skin immediately with plenty of water for 15 – 20 minutes. ▪ Call a poison control center or doctor for treatment advice.
IF IN EYES:	<ul style="list-style-type: none"> ▪ Hold eye open and rinse slowly and gently with water for 15-20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing. ▪ Call a poison control center or doctor for treatment advice.

Have the product container or label with you when calling a poison control center or doctor or going for treatment.

EMERGENCY TELEPHONE NUMBERS:
FOR MEDICAL EMERGENCIES: (866) 767-5089 (Rocky Mountain Poison Control Center)
FOR SPILLS OR TRANSPORTATION EMERGENCIES: (800) 424-9300 (Chemtrec)

EPA Registration No. 55050-5

EPA Establishment No. _____

Arkema Inc.
900 First Avenue
King of Prussia, PA 19046-1308
<http://www.arkema-inc.com> <http://www.paladin.com>
Net Contents: _____ lbs

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**PRECAUTIONARY STATEMENTS
HAZARD TO HUMANS AND DOMESTIC ANIMALS
WARNING**

May be fatal if swallowed. Harmful if inhaled or absorbed through skin. Do not breathe vapor. Causes slight eye irritation. Avoid contact with skin, eyes or clothing.

PERSONAL PROTECTIVE EQUIPMENT (PPE)

Some materials that are chemical-resistant to this product are made from Nitrile Rubber ≥ 14 mils, Butyl Rubber ≥ 14 mils, Neo-prene Rubber ≥ 14 mils, Polyvinyl Chloride (PVC) ≥ 14 mils, Viton ≥ 14 mils, and Barrier Laminate.

When performing tasks with potential for contact with liquid Dimethyl Disulfide (DMS), all handlers (including applicators) must wear:

- Well ventilated long-sleeved shirt and long pants.
- Chemical-resistant gloves,
- Chemical-resistant footwear with socks, and
- Full-face shield or safety glasses with brow, temple and side protection. DO NOT wear goggles.

When performing tasks with NO potential for contact with liquid DMS, all handlers (including applicators) must wear:

- Well ventilated long-sleeved shirt and long pants.
- Shoes plus socks.

In addition, when an air-purifying respirator is required, handlers must wear at minimum either:

- A NIOSH certified half-face or full facepiece air-purifying respirator equipped with an organic vapor (OV, NIOSH approval prefix TC-23C) cartridge and a particulate pre-filter (Type N, R, P, or HE, NIOSH approval number prefix TC-84A), or
- A gas mask with a canister approved for organic vapor (NIOSH approval number prefix TC-14G).

See Directions for Use, Protection for Handlers, Respiratory Protection and Stop Work Triggers, number 1 *Handlers*, for when an air-purifying respirator is required.

USER SAFETY REQUIREMENTS

- Remove all clothing that comes in contact with liquid material at once.
- Aerate all affected clothing thoroughly outdoors prior to washing.
- Discard clothing and other absorbent materials that have been drenched or heavily contaminated with this product's concentrate. Do not reuse them.
- Follow manufacturer's instructions for cleaning/maintaining PPE. If no such instructions for washables exist, use detergent and hot water. Keep and wash PPE separately from other laundry.

USER SAFETY RECOMMENDATIONS

Users should:

- Wash hands before eating, drinking, chewing gum, using tobacco, or using the toilet.
- Remove clothing/PPE immediately if pesticide gets inside. Then wash skin thoroughly and put on clean clothing.

- Remove PPE immediately after handling this product. Wash the outside of gloves before removing. As soon as possible, wash thoroughly and change into clean clothing.

ENVIRONMENTAL HAZARDS

Do not apply directly to water or to areas where surface water is present or to intertidal areas below the mean high water mark. Do not contaminate water when disposing of equipment washwater or rinsate.

Dimethyl disulfide has certain properties and characteristics in common with chemicals that have been detected in groundwater (dimethyl disulfide is highly soluble in water and has low adsorption to soil).

PHYSICAL OR CHEMICAL HAZARDS

This product contains flammable liquid and vapor with a flash point of 65.3°F. *Flammable - Store in a well ventilated area away from heat and sources of ignition such as flame, sparks and static electricity. Ensure that all storage and handling equipment is properly rated, grounded and installed to satisfy electrical classification requirements. Static electricity may accumulate and create a fire hazard. All storage containers must be bonded and grounded during filling operations. Store away from oxidizers and reactive materials. Keep container tightly closed. Precautions must be taken to prevent the ignition of flammable vapors when/where present by sources such as open flames, lightning, hot surfaces, radiant heat, smoking, cutting and welding, spontaneous ignition, frictional heat or sparks, static electricity, electrical sparks, stray currents, ovens, furnaces, and heating equipment. Observe all federal, state and local regulations and National Fire Prevention Association (NFPA) Codes which pertain to the specific local conditions of storage and use, including OSHA 29 CFR 1910.106 and NFPA 30, 55, 70, 77 and 497.*

Containers, pumps, and other transfer equipment made of aluminum, brass, copper, magnesium or their alloys may corrode when in contact with PALADIN® EC. Observe the equipment used for obvious corrosion and replace equipment as necessary. Stainless steel is a preferred material.

DIRECTIONS FOR USE

Restricted Use Pesticide.

It is a violation of Federal law to use this product in any manner inconsistent with its labeling. Read entire label before using this product.

Do not apply this product in a way that will contact workers or other persons, either directly or through drift. Only handlers may be in the application block from the start of the application until the entry restricted period ends, and in the buffer zone during the buffer zone period. For any requirements specific to your State or Tribe, consult the agency responsible for pesticide regulation.

Agricultural Use Requirements

Use this product only in accordance with its labeling and with the Worker Protection Standard, 40 CFR Part 170. This standard contains requirements for the protection of agricultural workers on farms, forests, nurseries, and greenhouses, and handlers of agricultural pesticides. It contains requirements for training, decontamination, notification, and emergency assistance. The requirements in this box apply to uses of this product that are covered by the Worker Protection Standard (WPS)

No instructions elsewhere on this labeling relieve users from complying with the requirements of the WPS.

For the entry restricted period and notification requirements, see the *Entry Restricted Period* and *Notification* sections of this labeling. PPE for Entry During the Entry Restricted Period: PPE for entry that is permitted by this labeling is listed in the *Personal Protective Equipment (PPE)* section of this labeling.

Terms Used in This Labeling

Soil Fumigant Training Program: Certified applicator training that provides information on (1) how to correctly apply the fumigant, including how to comply with new label requirements; (2) how to protect handlers and bystanders; (3) how to determine buffer zone distances; (4) how to complete an FMP and the post-application summary; (5) how to determine when weather and other site-specific factors are not favorable for fumigant application; (6) how to comply with required GAPs and how to document compliance with GAPs in the FMP; and (7) how to develop and implement emergency response plans.

Fumigant Safe Handling Information: Information that must be provided annually to handlers that must include the following: (1) what fumigants are and how they work, (2) safe application and handling of soil fumigants, (3) air monitoring and respiratory protection requirements for handlers, (4) early signs and symptoms of exposure, (5) appropriate steps to take to mitigate exposures, (6) what to do in case of an emergency, and (7) how to report incidents.

Application Block: Area within the perimeter of the fumigated portion of a field (including furrows, irrigation ditches, roadways). The perimeter of the application block is the border that connects the outermost edges of total area treated with the fumigant product.

Application Rate: The ratio of fumigant mass applied compared to the soil surface area (e.g., pounds of product per acre). The application rate is expressed on this labeling in terms of either the "treated area application rate" or the "broadcast equivalent application rate." The "treated area application rate" relates to only the rate of fumigant applied to the portion of the field that is fumigated (e.g., rate within the bed or strips). The "broadcast equivalent application rate" relates to the rate of fumigant applied within the entire perimeter of the application block. For bedded and strip applications, the "broadcast equivalent application rate" must be calculated to determine the buffer zone distance required by this labeling.

Start of the Application: The time at which the fumigant is first delivered/dispensed into the soil in the application block.

Application is Complete: The time at which the fumigant has stopped being delivered/dispensed into the soil and the soil has been sealed; drip lines have been purged (if applicable).

Entry Restricted Period: This period begins at the start of the application and expires depending on the application method and if tarps are used when the tarps are perforated and removed. Entry into the application block during this period is only allowed for appropriately PPE-equipped handlers performing handling tasks. See the *Entry Restricted Period and Notification* section for additional information

Buffer Zone: An area established around the perimeter of each application block. The buffer zone must extend outward from the edge of the application block perimeter equally in all directions.

Buffer Zone Period: Begins at the start of the application and lasts for a minimum of 48-hours after the application is complete. Non-handlers must be excluded from the buffer zone during the buffer zone period.

Difficult to Evacuate Sites: Pre-K to Grade 12 schools, state licensed daycare centers, nursing homes, assisted living facilities, hospitals, in-patient clinics, and prisons.

Owner: Any person who has a present possessory interest (fee, leasehold, rental, or other) in an agricultural establishment. A person who has both leased such agricultural establishment to another person and granted that same person the right and full authority to manage and govern the use of such agricultural establishment is not an owner. See definition of "owner" in WPS (40 CFR §170.3).

Roadway: Portion of a street or highway improved, designed or ordinarily used for vehicular travel, exclusive of the sidewalk or shoulder even if such sidewalk or shoulder is used by persons riding bicycles. In the event a highway includes two or more separated roadways, the term *roadway* shall refer to any such roadway separately.

Representative Handling Task: For air monitoring, the locations and handler activities sampled must represent each handler's exposure occurring within the application block. For example, for an application consisting of a seven-handler crew (1 tractor driver, 1 tractor co-pilot, 4 shovelers, and 1 certified applicator supervising) two breathing zone samples could be collected: one sample for the tractor co-pilot and one sample for a downwind shoveler. Results of previous sampling may indicate which tasks and locations are worst case and therefore representative of all handlers.

Certified Applicator Training

Any certified applicator supervising a soil fumigant application must have successfully completed one of the soil fumigant training programs listed on the following EPA website www.epa.gov/fumiganttraining for the active ingredient in this product. The training must be completed in the time frames listed on the website. The FMP must document the date and location where the soil fumigant training program was completed.

Product Information

PALADIN® EC is an emulsifiable liquid fumigant for the preplant treatment of soil borne pests on land suitable for the cultivation of crops. PALADIN® EC can be used in pest management programs (chemical, cultural, biological, varieties) and pest control disciplines (nematology, plant pathology, weed control) in a systematic approach to pest management decisions.

PALADIN® EC may be applied through surface or buried drip tape. Use of a tarp seal is mandatory for all applications of this product.

Note: Co-application with chloropicrin will enhance the spectrum of control of weeds and soil-borne pathogens. If chloropicrin, metam-sodium or 1,3-dichloropropene products are co-applied with PALADIN® EC, follow the most restrictive precautions and directions for use on the labels, e.g., regarding reentry, buffer zones, PPE requirements, and planting interval, as these intervals may be longer, and/or more restrictive, and may require additional crop testing methods.

Prior to chemigation, it is important to know the history of the field planned for treatment. Soil sampling for the type and number of pests present should be conducted prior to treatment. In fields where soil samples indicate the presence of high populations of nematodes, soil pathogens and weeds, it cannot be expected that entire populations can be eradicated. Therefore, soil sampling and crop modeling after treatment should be done to determine if additional pest management measures are needed.

Consult your agricultural advisor, University contact or Extension Service for recommended pest management practices for your area. Use recommended integrated pest management practices so that you are not solely relying on chemical control in your crop production. Use post-harvest weed control, destruction of crop residues, and other cultural practices that may aid in the reduction of soil borne pests for the next cropping season.

Restrictions and Use Precautions

- Soil fumigation with PALADIN® EC must be used in compliance with all directions and use conditions described in this label.
- The use of this product is restricted to the methods described in this label.
- This product is not for use in greenhouses.
- This product is not for residential use.
- Tarps are required for all PALADIN® EC applications. See <http://www.epa.gov/pesticides/dmnds-tarps> for a list of tarps that have been approved for use with this product. Only tarps on this website can be used for Paladin® EC applications.
 - NOTE: In Florida, only the high barrier films listed under "Tarps Approved for Use with DMDS Applications In Florida" on EPA's Soil Fumigant site are permitted for use.

- Prior to initiating the chemigation/fumigation, the planting beds should be formed, have the drip tape(s) in place, with the beds covered and sealed with a tarp that has been approved for use with this product.
- PALADIN® EC can not be applied under tarps with existing plant holes.
- Comply with all local ordinances and regulations.
- Applications are limited to 40 contiguous acres or less per day.
- Never fumigate alone. A minimum of two persons must be present during handling and application of soil fumigants.
- Additional instructions must be made available to handlers in the mechanical operation of the tractor and how to safely work with the operator while fumigating.
- Always handle this product in the open, with all handlers positioned “upwind” from the container and/or where there is adequate ventilation.
- Do not change cylinders when the fumigant system is under pressure. Change cylinders with all cylinder valves in the off position.
- It is required that 5 gallons of water be readily available for rinsing and cleaning purposes. An additional 5 gallons of water must be available in the service truck. This water must be potable and in containers marked “Decontamination water not to be used for drinking”.
- Keep all pets, livestock and other domestic animals out of the treated areas for 12 days. Most chemigation applications will not result in tarp removal.
- **Recontamination:** PALADIN® EC will control or suppress those pests in the fumigation zone at the time of treatment. It will not control pests that are introduced into the soil after treatment. Precautions should be taken to prevent contamination of treated fields with weed seed, plant pathogenic fungi, and plant parasitic nematodes. Farm equipment should be clean before entering treated fields. Equipment should be rinsed free of soil and weed seeds from other fields. Avoid the use of irrigation water, transplants, seed pieces and/or soil, which could carry soil borne pests from infested land.
- **Equipment Cleaning Procedures:** Because PALADIN® EC is corrosive under certain conditions, flush all application equipment with water and dispose of rinsate by incorporation into a field just treated or by other approved means. To prevent corrosion, where appropriate, lubricate with fuel oil, kerosene or similar type of petroleum solvent immediately after use. Fill pumps and meters with new motor oil or a 50% motor oil/fuel oil mixture before storing. **Do not use water for long-term storage.** Unused PALADIN® EC or rinsate must never be introduced into surface or ground water.
- **Fertility Interactions:** Chemigation may temporarily reduce nitrification in the soil, thus increasing levels of ammonium nitrogen and soluble ammonium salts to potentially phytotoxic levels. Accumulation of the ammonium nitrogen and salts is most likely to occur when maximum rates of fumigant and fertilizer are applied to soils that are acidic, cold or high in organic matter. Acid soils should be limed before chemigation to stimulate nitrification and to reduce possible ammonium toxicity. To avoid injury to crops grown in high organic soils, fertilizers containing ammonium salts are not recommended
- Failure to meet these conditions may result in unsatisfactory product performance:
 - **Application Timing:** PALADIN® EC can be applied at any time of the year when soil and weather conditions permit. Conditions that allow rapid diffusion of the fumigant as a gas/liquid through the soil will normally give the best results. Because PALADIN® EC could be injurious to established vegetation, it should only be used as a preplant application.
 - **Odor During Application:** PALADIN® EC can range from garlic-like to propane-like odor. Some level of odor may be evident during application, however any strong odors during application are a signal that the fumigant is escaping and not properly sealed in the soil. Equipment should be checked for leaks. Tears in the tarp should be repaired immediately.

Special Use Precautions for Chemigation Application Equipment

1. Crop injury or lack of effectiveness can result from non-uniform distribution of treated water.
2. If you have questions about calibration, contact State Extension Service specialists, equipment manufacturers or other experts.
3. Do not connect irrigation systems used for pesticide application to a public water system unless the pesticide label-prescribed safety devices for public water systems are in place (see #5 below).

4. Only a person knowledgeable of the chemigation system and responsible for its operation, or a person under the supervision of the responsible person, shall operate the system and make necessary adjustments should the need arise. Do not chemigate alone. A second person knowledgeable with the chemigation system and safety procedures should be readily available.
5. The irrigation system must have a standard single check valve, low pressure drain, and vacuum relief valve (a "chemigation" valve) upstream of the injection point to prevent possible contamination of the water source (including public water systems) by fumigants.
6. The pesticide injector must be equipped with a check valve to prevent water from flowing back into the fumigant tank and an automatic quick-closing valve to stop fumigant injection when water flow is interrupted or loses pressure. The fumigant automatic shut-off valve can be electrically or hydraulically activated and should be normally closed at the injector.
7. The irrigation line or water pump must include a functional pressure switch that will stop the water pump motor when the water pressure decreases to the point where pesticide distribution is adversely affected.
8. Injection systems must use a pressure-safe cylinder or commercial equipment that is suitable for fumigant application. This equipment must be constructed of materials that are compatible with PALADIN® EC and capable of being fitted with a system interlock.

Handlers

The following activities are prohibited from being performed by anyone other than persons who have been appropriately trained and equipped as handlers in accordance with the requirements in WPS (40 CFR Part 170):

- Monitoring fumigant air concentrations;
- Cleaning up fumigant spills (this does not include emergency personnel not associated with the application);
- Handling or disposing of fumigant containers;
- Cleaning, handling, adjusting, or repairing the parts of application equipment that may contain fumigant residues; and
- Performing any handling tasks as defined by the WPS (40 CFR 170).

The following activities are prohibited from being performed in the application block from the start of the application until the entry restricted period ends and in the buffer zone during the buffer zone period by anyone other than persons who have been appropriately trained and equipped as handlers in accordance with the requirements in WPS (40 CFR Part 170).

NOTE: persons installing, perforating, removing, repairing, and monitoring tarps are considered handlers for the durations listed below. Prohibited activities (except for trained and equipped handlers) include:

- Participating in the application as supervisors, mixers, loaders, or as other direct application participants.
- Installing, repairing, operating, or removing irrigation equipment;
- Performing scouting, crop advising, or monitoring tasks;
- Installing, perforating (cutting, punching, slicing, poking), removing, repairing, or monitoring tarps:
 - until 21 days after application is complete, if tarps are not perforated and not removed for 21 days after application, or
 - until 48 hours after tarp perforation is complete if tarps are perforated less than 21 days after the application is complete and tarps will not be removed prior to planting, or
 - until tarp removal is completed if tarps are removed less than 21 days after the application is complete.
- NOTE: see *Tarp Perforation and/or Removal* section on this labeling for requirements about when tarps are allowed to be perforated.

Handlers do not include local, state, or federal officials performing inspection, sampling, or other similar official duties.

Protection for Handlers

Supervision of Handlers

For drip applications, a certified applicator must be in the line of sight of the application at the start of the application, including set-up, calibration, and initiation of the application. A certified applicator may leave but must return at least every two hours to visually inspect the equipment to ensure proper functioning, and must directly supervise all WPS-trained handlers until the application is complete. WPS-trained handlers may perform these monitoring functions in place of a certified applicator but they must be under the supervision of a certified applicator and be able to communicate with a certified applicator at all times during monitoring activities via cell phone or other means.

For handling activities that take place after the application is complete until the entry restricted period expires, the certified applicator is not required to be on-site, but must have communicated in a manner that can be understood by the site owner and handlers responsible for carrying out those activities the information necessary to comply with the label and procedures described in the FMP (e.g., emergency response plans and procedures).

IMPORTANT: This requirement does not override the requirements in the Worker Protection Standard for Agricultural Pesticides for information exchange between operators of agricultural establishments and commercial pesticide applicators.

The certified applicator must provide **Fumigant Safe Handling Information** to each handler or confirm that within the past 12 months, each handler has received **Fumigant Safe Handling Information** in a manner that he/she can understand. **Fumigant Safe Handling Information** will be provided where this product is purchased or at <http://www.epa.gov/fumigantraining>.

For all handling tasks at least two handlers must be present.

Exception: After the application is complete, only one trained handler is required to perform fumigant site monitoring tasks outside of the buffer zone.

Exclusion of Non Handlers from the Application Block and Buffer Zone:

The certified applicator supervising the application and the owner of the establishment where the application is taking place must make sure that all persons who are not trained and PPE-equipped and who are not performing one of the handling tasks as stated in this labeling are:

- excluded from the application block during the entry restricted period, and
- excluded from the buffer zone during the buffer zone period (see buffer zone exemption for transit on roadways in Buffer Zone Requirement section).

Local, state, or federal officials performing inspection, sampling, or other similar official duties are not excluded from the application block or the buffer zone by this labeling. The certified applicator supervising the application and the owner of the establishment where the application is taking place are not authorized to, or responsible for, excluding those officials from the application block or the buffer zone.

Providing, Cleaning, and Maintaining PPE:

The employer of any handler (as stated in this label) must make sure that all handlers are provided and correctly wear the required PPE. The PPE must be cleaned and maintained as required by the Worker Protection Standard for Agricultural Pesticides.

Air-Purifying Respirator Availability:

The employer of any handler must confirm that an air-purifying respirator and appropriate cartridges/canisters of the type specified in the *PPE* section of this labeling are immediately available for each handler who will wear one. At a minimum two handlers must have the appropriate air-purifying respirator and cartridges/canisters available (see *Respirator Fit Testing, Medical Qualification, and Training* section for additional requirements).

Exception: Air-purifying respirators do not need to be made available for handlers performing fumigant site monitoring tasks outside of the buffer zone.

Cartridges or canisters must be replaced when odor or sensory irritation from this product becomes apparent during use, if the measured concentration of DMDS is greater than or equal to 550 ppb, or after 8 hours of cumulative use, whichever occurs first.

Respirator Fit Testing, Medical Qualification, and Training:

Using a program that conforms to OSHA's requirements (see 29 CFR Part 1910.134), employers must verify that any handler who uses a respirator is:

- Fit-tested and fit-checked,
- Trained, and
- Examined by a qualified medical practitioner to ensure physical ability to safely wear the style of respirator to be worn. A qualified medical practitioner is a physician or other licensed health care professional who will evaluate the ability of a worker to wear a respirator. The initial evaluation consists of a questionnaire that asks about medical conditions (such as a heart condition) that would be problematic for respirator use. If concerns are identified, then additional evaluations, such as a physical exam, might be necessary. The initial evaluation must be done before respirator use begins. Handlers must be reexamined by a qualified medical practitioner if their health status or respirator style or use-conditions change.
- Upon request by local/state/federal/tribal enforcement personnel, employers must provide documentation demonstrating how they have complied with these requirements.

Respiratory Protections and Stop Work Triggers

Handlers

The following procedures must be followed to determine whether an air-purifying respirator is required or if operations must cease for any person performing a handling task (except for fumigant site monitoring outside of the buffer zone) as stated in this label.

- If at any time any handler detects the garlic-like odor of this product, then either:
 - An air-purifying respirator must be worn by all handlers who remain in the application block or surrounding buffer zone, or
 - Operations must cease and handlers not wearing an air-purifying respirator must leave the application block and surrounding buffer zone.
- Handlers can remove air-purifying respirators or resume operations if two consecutive breathing zone samples taken at the handling site at least 15 minutes apart show that levels of DMDS have decreased to less than 55 ppb. During the collection of air samples, an air-purifying respirator must be worn by the handler taking the air samples. Samples must be taken at the location where the odor was first detected. If sampling is not done, after one hour and at hourly intervals thereafter, handlers can remove their air-purifying respirators momentarily to determine if the garlic-like odor is still detectable. If detectable, the respirator must be put back on.
- When using devices to monitor air concentration levels, a direct read detection device, such as an electronic device or a colorimetric device must be used. The devices must have sensitivity of at least 55 ppb for DMDS. Persons using direct read detection devices must follow the manufacturer's directions.
- When breathing zone samples are required, they must be taken outside respiratory protection equipment and within a 10 inch radius of the handler's nose and mouth.

Tarp Perforation and/or Removal

IMPORTANT: Persons perforating, repairing, removing, and/or monitoring tarps are defined, within certain time limitations, as handlers (see *Handlers* section), and they must be provided the PPE and other protections for handlers as required on this labeling and in the Worker Protection Standard for Agricultural Pesticides.

- Tarps must not be perforated until a minimum of 12 days have elapsed after the application into the soil is complete (i.e., after the drip irrigation system has been completely flushed with water following chemigation).
- If tarps are perforated within 21 days after the application is complete, tarp removal must not begin until at least 2 hours after tarp perforation is complete.
- Tarps may be perforated manually **ONLY** for the following situations:
 - At the beginning of each row when a coultter blade (or other device which performs similarly) is used on a motorized vehicle such as an ATV.
 - In fields that are 1 acre or less.
- In all other instances tarps must be perforated (cut, punched, poked, or sliced) only by mechanical methods.

- If tarps are left intact for a minimum of 21 days after the application has been completed, planting or transplanting may take place while the tarps are being perforated.

Entry Restricted Period and Notification

Entry Restricted Period: Entry into the application block (including early entry that would otherwise be permitted under the WPS) by any person – other than a correctly trained and PPE-equipped handler who is performing a handling task listed on this labeling – is PROHIBITED - from the start of the application until:

- 5 days (120 hours) after application is complete if tarps are not perforated and removed for at least 21 days after application is complete, or
- 48 hours after tarp perforation is complete if tarps will be perforated within 21 days after the application is complete and will not be removed for at least 21 days after the application is complete, or
- tarp removal is completed if tarps are both perforated and removed less than 21 days after the application is complete.

NOTES:

- See *Tarp Perforation and/or Removal* section on this labeling for requirements about when tarps are allowed to be perforated.
- When listing application information for soil fumigant applications to comply with part 170.122 of the WPS, list the entry restricted period time frame in place of the REI.

Notification: Notify workers of the application by warning them orally and by posting Fumigant Treated Area signs. The signs must bear the skull and crossbones symbol and state:

- (1) "WARNING/AVISO"
- (2) "Areas under fumigation, DO NOT ENTER/NO ENTRE"
- (3) Dimethyl Disulfide Fumigant In Use
- (4) Date and time of fumigation
- (5) Date and time entry restricted period is over
- (6) PALADIN® EC, and (fill in co-application), and
- (7) Name, address, and telephone number of the Certified Applicator in charge of the fumigation.

Post the Fumigant Treated Area sign instead of the WPS sign for this application, but follow all WPS requirements pertaining to location, legibility, text size, and sign size (40 CFR §170.120).

Post Fumigant Treated Area signs at all entrances to the application block no sooner than 24 hours prior to application.

Fumigant Treated Area signs must remain posted for no less than the duration of the entry restricted period.

Fumigant Treated Area signs must be removed within 3 days after the end of the entry restricted period.

Mandatory Good Agricultural Practices (GAPs)

The following GAPs must be followed during all fumigant applications.

- PALADIN® EC must be transferred through connecting hoses, pipes, and/or couplings sufficiently tight to prevent workers or other persons from coming in contact with the liquid.
- All hoses, piping, and tanks used in connection with this product shall be of a type appropriate for use under the pressure and vacuum conditions to be encountered.
- Hoses between any fumigant container and the flow divider must be Teflon® hoses reinforced with stainless steel wire braid or its equivalent.
- External sight gauges, if applicable, shall be equipped with a valve so that pipes to sight gauge can be shut off in case of breakage or leakage.

- The mechanical transfer system must be adequate to make necessary measurements of the pesticide being used.
- Shut-off devices must be installed on the exit end of all cylinder connections and at all disconnect points to prevent leakage of product when the transfer is stopped and hose is removed or disconnected.
- The pressure in hoses used to move the product must not exceed the manufacturer's maximum pressure specifications.
- Check equipment to ensure good condition and integrity prior to each use.

Planting Interval following chemigation

- To minimize the potential for crop injury, allow the fumigant to dissipate before planting a crop. Seeds may be used as a bioassay to determine if PALADIN® EC is present in the soil at concentrations sufficient to cause plant injury. (See Lettuce Seed Test and Tomato Transplant Test).
- Subsurface (Seepage) Irrigation - Raising the water table into the injection zone prior to planting will reduce PALADIN® EC efficacy and increase plant-back interval
- Planting must not occur for at least 21 days after the application is complete.
- **Planting Intervals following application**

The planting interval should be determined based on mean daily low soil temperature at 8" depth.

Soil Temperature	Planting Intervals following application
50 – 54°F	42 days after the application is complete
55 – 60°F	35 days after the application is complete
61 – 70°F	28 days after the application is complete
71°F and higher	21 days after the application is complete

The length of time may vary for PALADIN® EC to dissipate from the soil before transplanting and seeding safely. Circumstances which do not favor the dissipation of PALADIN® EC can lengthen the plant-back interval. The plant-back interval is lengthened with (1) heavy soil, (2) low soil temperatures, (3) high soil moisture. If in doubt, perform either the lettuce seed test or the tomato transplant test as described below.

Lettuce Seed Test

1. Dig into the treated soil with a trowel to or just below the depth of planting. Remove 2 to 4 small soil samples (approximately 1 to 2 ounces each), mix lightly, and immediately place each sample into an air-tight jar so that fumes will not escape. Use jars with gas-tight lids. Moisten the soil samples and cap immediately.
2. Uncap the jar, sprinkle lettuce seeds on the moistened surface of the soil and recap immediately. Prepare an additional jar in the same manner using untreated soil (untreated check) for comparison.
3. Store the jars at 65°F to 85°F; do not place in direct sunlight. Direct sunlight may overheat the soil in the jars and kill the seed. Lettuce seed will not germinate in the dark.
4. Inspect the jars in 1 to 3 days to look for germination.
5. The treated soil is acceptable for planting if the seeds in the treated jar germinate the same as the seeds in the untreated (check) jar.

NOTE: Be sure (1) to take soil samples from the field in several areas, particularly low, wet areas; (2) that the jar lids are air-tight and do not have grit under the seal which may prevent proper sealing; and (3) that the jars are placed in indirect sunlight and not in the dark.

Tomato Transplant Test

Transplant 5 to 10 succulent, fast-growing tomato seedlings into fumigated beds approximately 4 to 6 inches deep. Also transplant 5 to 10 tomato seedlings in a non-fumigated area to serve as untreated checks. If there is variation in the field, plant into the wettest, heaviest soil. Inspect the tomato transplants in 2 days for wilting or "root burn." If plants in the fumigated zone look the same as those in the non-fumigated zone, it is acceptable to plant in the treated area.

Which Test Method to Use?

Both the lettuce seed and tomato transplant tests are appropriate and can serve the purpose. The response of tomato seedlings varies somewhat depending on how succulent they are, temperature, soil moisture, relative humidity, and other weather and soil factors. Relative differences between plants in fumigated and non-fumigated areas are key to detecting low-level residue effects. High soil concentrations of fumigant should produce clear-cut symptoms. The lettuce seed test in jars is not subject to the variations in the field that can affect the tomato transplant test. However, the process of collecting a soil sample for the lettuce seed test has the potential to allow some fumigant to escape prior to sealing the jar. In addition, excess soil moisture can inhibit normal lettuce seed germination reducing the sensitivity of the test.

Tarps (the use of tarps is required for all PALADIN® EC applications. See <http://www.epa.gov/pesticides/dmids-tarps> for a list of tarps that have been approved for use with this product. NOTE: In Florida, only the high barrier films listed under "Tarps Approved for Use with DMDS Applications In Florida" on EPA's Soil Fumigant site are permitted for use.

- A written tarp plan must be developed and included in the FMP.
- Once a tarp is perforated, the application is no longer considered tarped.
- Tarps must be installed prior to the start of the application.
- Tarp edges must be buried along the furrow and at the ends of rows.

Weather Conditions

- To determine if unfavorable weather conditions exist or are predicted (see Identifying Unfavorable Weather Conditions section) and whether an application should proceed, the National Weather Service weather forecast must be checked by the certified applicator supervising the application:
 - on the day of, but prior to the start of the application, and
 - on a daily basis during the application if the time period from the start of the application until the application is complete is greater than 24 hours.
- Do not apply if an air stagnation advisory issued by the National Weather Service is in effect for the area in which the application is planned, during the application, or the 48 hours after the application is complete.
- Do not apply if light wind conditions (< 2 mph) are forecast to persist for more than 18 consecutive hours from the time the application starts until 48 hours after the application is complete.
- Detailed National Weather Service forecasts for local weather conditions, wind speed, and air stagnation advisories may be obtained on-line at: <http://www.nws.noaa.gov>, on NOAA weather radio, or by contacting your local National Weather Service Forecasting Office.

Identifying Unfavorable Weather Conditions

- Unfavorable weather conditions block upward movement of air, which results in trapping fumigant vapors near the ground. The resulting air mass can move off-site in unpredictable directions. These conditions typically exist within an hour prior to sunset and continue past sunrise and may persist as late as noontime. Unfavorable conditions are common on nights with limited cloud cover and light to no wind and their presence can be indicated by ground fog or smog and can also be identified by smoke from a ground source that flattens out below a ceiling layer and moves laterally in a concentrated cloud.

Soil Preparation

- Soil must be properly prepared and at the surface generally be free of large clods. The area to be fumigated must be tilled to a depth of 5 to 8 inches.
- Till fields with known plowpans because they can lead to puddling of the fumigant due to inadequate soil drainage.
- Field trash must be properly managed. Residue from a previous crop must be worked into the soil to allow for decomposition prior to the start of the application. Little or no crop residue shall be present on the soil surface. Crop residue that is present must not interfere with the soil seal. Removing the crop residue prior to the start of the application is important to limit the natural “chimneys” that occur in the soil when crop residue is present. These “chimneys” allow the soil fumigants to move through the soil quickly and escape into the atmosphere. This may create potentially harmful conditions for workers and bystanders and limit the efficacy of the fumigant. However, crop residue on the field serves to prevent soil erosion from both wind and water and is an important consideration. To accommodate erosion control, fumigant efficacy, and human health protection, clear fields of crop residue as close to the start of the application as possible to limit the length of time that the soil would be exposed to potentially erosive weather conditions.
- Beds must be formed, surface or buried drip irrigations lines laid and a tarp seal installed as a necessary preparation for chemigation/fumigation. See <http://www.epa.gov/pesticides/dmids-tarps> for the tarps approved for use with this product. For best results, the entire bed should be wetted from edge-to-edge. This may required more than one drip line. Drip emitters should be a maximum of 12 inches apart.

Soil Temperature

- The soil temperature at the depth of injection must not be less than 45° F or exceed 90° F at the beginning of the application.
- If air temperatures have been above 100° F in any of the three days prior to the start of the application, then soil temperature must be measured and recorded in the FMP. Record temperature measurements at the application depth.

Soil Moisture

- For all soil types, pre-application moisture should be dry enough to prevent soil saturation and bed collapse once application and flushing is complete.

Product and Dosage

- Plan the application by calculating the amount of fumigant required at the appropriate rate for the crop, acreage, and target pest. The fumigant must be metered into the water supply line and then passed through a mixing device, such as a centrifugal pump or static mixer, to assure proper agitation.

System Controls and Integrity

- The irrigation system (main lines, headers, drip tape) must be thoroughly checked for leaks before the start of application. Leak detection requires that the irrigation system be at full operating pressure. The amount of time needed at full operating pressure will vary by irrigation system design. Look for puddling along major pipes (holes in pipes or leaky joints), at the top and ends of rows (leaky connection, open drip tape), and on the bed surface (damaged drip tape, malfunctioning emitters). Any leaks discovered during the pre-application check must be repaired prior to the start of the application.
- To inject fumigant, use a metering system (such as a positive pressure system, positive displacement injection pump, diaphragm pump, flow meter or a Venturi system) effectively designed and constructed of materials that are compatible with the fumigant and capable of being fitted with system interlocking controls. Do not use containers, pumps, or other equipment made of aluminum, magnesium, copper or their alloys (eg. Brass or bronze) as Paladin®EC can be corrosive to such metals.
- The system must contain:
 - A functional check valve, a vacuum relief valve, and low-pressure drain appropriately located on the irrigation pipeline to prevent water source contamination and backflow;
 - A functional, automatic, quick-closing check valve to prevent the flow of fluids back toward the fumigant container;

- A functional, normally closed valve located on the intake side of the injection point and connected to the system interlock to prevent the fumigant from being withdrawn from the supply tank when the irrigation system is either automatically or manually shut down; and
- Functional interlocking controls to automatically shut off the fumigant injection when the irrigation water flow stops or decreases to the point where fumigant distribution is adversely affected.

Site of Injection and Irrigation System Layout

- Site of injection must be as close as practical to the area being treated (such as direct injection of fumigant into the header pipe/manifold or into an aboveground delivery pipe attached to the header). If the fumigant is injected into a main line, make sure the irrigation pipe is able to be cleared of all fumigant as the fumigant may pool in low sections of the pipe. Also make sure that valves on lateral lines of the main line are closed if these lateral lines lead to areas not being fumigated at the time of the application.

System Flush

- After application of the fumigant, continue to drip-irrigate the area with water to flush the irrigation system. Do not allow the fumigant to remain in the irrigation system after the application is complete. The total volume of water, including the amount used for flushing the irrigation system, must be adequate to completely remove the fumigant from the lines, but should be less than the amount that could over-saturate the beds (bed collapse can occur from over-saturation). If common lines are used for both the fumigant application and water seal (if a water seal is applied) these lines must be adequately flushed before starting the water seal and/or normal irrigation practices.

Soil Sealing

- Tarps approved for use with this product must be put in place before the application starts.
- Tarp edges must be buried along the furrow and at the ends of rows.

Application methods and equipment

- Apply this product only through surface and buried drip tape irrigation systems. Do not apply this product through any other type of irrigation system except as described in this labeling.
- Ensure lateral distribution of water phase is uniform across the area to be treated. Bed width, soil type and the irrigation system capabilities should be considered for maximum spread of the fumigant in the water phase. This may require more than 1 drip tape per bed.
- Drip emitters should be spaced 12 inches or less apart on the drip tape(s).
- Water flow and PALADIN® EC application rate must be known in order to calculate and calibrate for the correct ppm.
- The concentration of PALADIN® EC must be a minimum of 1500 ppm and a maximum of 2,700 ppm in the drip tapes except where documentation can be provided showing that the drip-line has been tested for use at higher concentrations, in which case a maximum concentration of 5,400 ppm may be used. PALADIN® EC must be metered into the water supply with enough distance between the injection point and the treated field to assure proper mixing before it is distributed into the drip tube irrigation system.
- Step 1 - Pre-Fumigation/chemigation:
 - Prior to a PALADIN® EC application a pre-chemigation irrigation should be conducted to ensure soil moisture is uniformly at, or near, field capacity throughout the treatment area to improve the distribution of PALADIN® EC through the soil profile of the bed, to stimulate activity and growth of soil borne pathogens and nematodes and to initiate germination of weed seed.
 - Begin pre-chemigation irrigation with a clean drip tape.
 - Ensure there is adequate and uniform line pressure throughout the irrigation system.
 - During the pre-chemigation irrigation inspect the irrigation system, drip tapes and chemigation components to ensure there are no leaks, kinking, ponding, puddling or run-off.
- Step 2 - Fumigation/chemigation:
 - Apply the appropriate rate of PALADIN® EC in an acceptable amount of water to ensure the maximum lateral movement of the water phase within a minimum of 1500 ppm and a maximum of 5,400 ppm of PALADIN® EC in the drip tapes.

- Do not allow the treatment solution to accumulate on the soil surface. If ponding, puddling or run-off occurs 1) discontinue application immediately, and 2) cover with soil immediately to absorb the spill, before resuming application.
- Step 3 - Post-Fumigation/chemigation application:
 - After application completely flush system with adequate untreated water to ensure there is no mixture remaining in the system. Ensure all system dead ends and low spots have been completely flushed.
 - Do not allow PALADIN® EC to remain in the irrigation system.
 - The area can be irrigated with overhead sprinklers (with about 0.25 inches of water) within a few hours of completing the application and again within 12 – 24 hours of the fumigation to aid in chemical retention, reducing volatilization and reducing odor emissions escaping from the untarped row middles.

Calibration, Set-up, Repair, and Maintenance for Application Equipment

- From the PALADIN® EC cylinder to the injection point into the irrigation water (where components are exposed to undiluted PALADIN® EC), use components having wetted surfaces made of stainless steel, steel, fluoropolymer (PTFE, PFA and PVDF), EPDM and/or Viton. PALADIN® will corrode brass and other copper alloys over time. Do not use PVC, galvanized steel, nylon or aluminum.
- From the PALADIN EC injection point, after mixing with irrigation water, the drip irrigation system may include components made of rigid PVC, stainless steel, steel, polyethylene, nylon, fluoropolymer, EPDM and Viton. The drip irrigation system downstream of the injection point must not be exposed to PALADIN® EC at concentrations exceeding 2,700 ppm (w/w) except where qualified drip lines rated to 5,400 ppm (w/w) are used.
- Do not allow PALADIN® EC to sit in polyethylene tubing for extended periods. Polyethylene tubing may swell or soften over time. Fluoropolymer (PFA, PTFE or PVDF) tubing is preferred for PALADIN® EC service.
- Application equipment must include a flow meter or a constant pressure system with orifice plates or restrictors to ensure the proper amount of fumigant is applied.
- To prevent the backflow of fumigant into the compressed gas cylinder (e.g., nitrogen, other inert gas), if used, applicators must:
 - When applying PALADIN® EC from steel cylinders, using compressed gas, ensure that minimum positive pressure of over 140 psi is maintained in the gas cylinder during the entire time it is connected to the application rig,
 - Ensure that application rigs are equipped with properly functioning check valves between the compressed gas cylinder system and the fumigant cylinder. The check valve is best placed on the outlet side of the pressure regulator, and is oriented to only allow compressed gas to flow out of the cylinder.
 - A pressure relief valve must be installed between the regulator and the check valve to ensure a regulator failure does not overpressurize the fumigant cylinder.
 - Always pressurize the system with compressed gas before opening the fumigant cylinder valve.
- Before using chemigation equipment for the first time, or when preparing it for use after storage, the operator must check the following items carefully:
 - Check the filter, and clean or replace the filter element as required.
 - Check and clean the orifice plates and screen checks, if installed.
 - Pressurize the system with compressed gas or compressed air, and check all fittings, valves, and connections for leaks using soap solution.
- Install the fumigant cylinder, and connect and secure all tubing. Slowly open the compressed gas valve, and increase the pressure to the desired level. Slowly open the fumigant cylinder valve, always watching for leaks.
- When the application is complete, close the fumigant cylinder valve and flush residual fumigant out of the fumigant lines into the soil using water to completely flush fumigant. At the end of the application, disconnect all fumigant cylinders from the irrigation system. At the end of the season, seal all tubing openings with tape to prevent the entry of insects and dirt.

Application equipment must be calibrated and all control systems must be working properly. Proper calibration is essential for application equipment to deliver the correct amount of fumigant uniformly to the soil. Refer to the manufacturer's instructions on how to calibrate your equipment, usually the equipment manufacturer, fumigant dealer, or Cooperative Extension Service can provide assistance.

Application Rates and Uses

PALADIN® EC is recommended for control or suppression of weeds, soil-borne plant pathogens and nematodes in soils to be planted to vegetable crops, fruit crops, and nursery/ornamental field crops where plastic tarp is used for chemigation.

The following table provides application rates in gallons and pounds of PALADIN® EC per treated acre (if the entire surface acre was tarped and treated, such as a flat fume chemigation application).

TABLE 1. PRE-PLANT SOIL FUMIGATION APPLICATION RATES TABLE

Crop	Pests	Rate of PALADIN® EC/treated Acre	
		Gallons	Pounds
Fruiting Vegetables Tomatoes Peppers Eggplant Cucurbit crops Cucumbers Squash (all) Melons (all)	Weeds such as- <i>Nutsedge (Purple and Yellow), Chickweed, Lambsquarters, Purslane, Grasses</i>	54.2	479
Small Fruit Crops Strawberries Blueberries	Soil Borne Plant Pathogens such as- <i>Verticillium, Fusarium, Pythium, Sclerotinia, Rhizoctonia</i>	42.3 - 54.2	374 - 479
Field Grown Ornamentals Forest Nursery Crops	Nematodes such as- <i>Root Knot (Southern, Northern and Colombia), Stubby Root, Lesion, Stunt, Sting</i>	37 – 54.2	326 - 479

Notes: Use the higher rate of product when there is a mixture of these pests.
 The maximum application rate for pre-plant soil use is 479 pounds per treated acre of PALADIN® EC.

Calculating the Broadcast Equivalent Application Rate

To calculate the broadcast equivalent rate for bedded or strip applications the following information is needed:

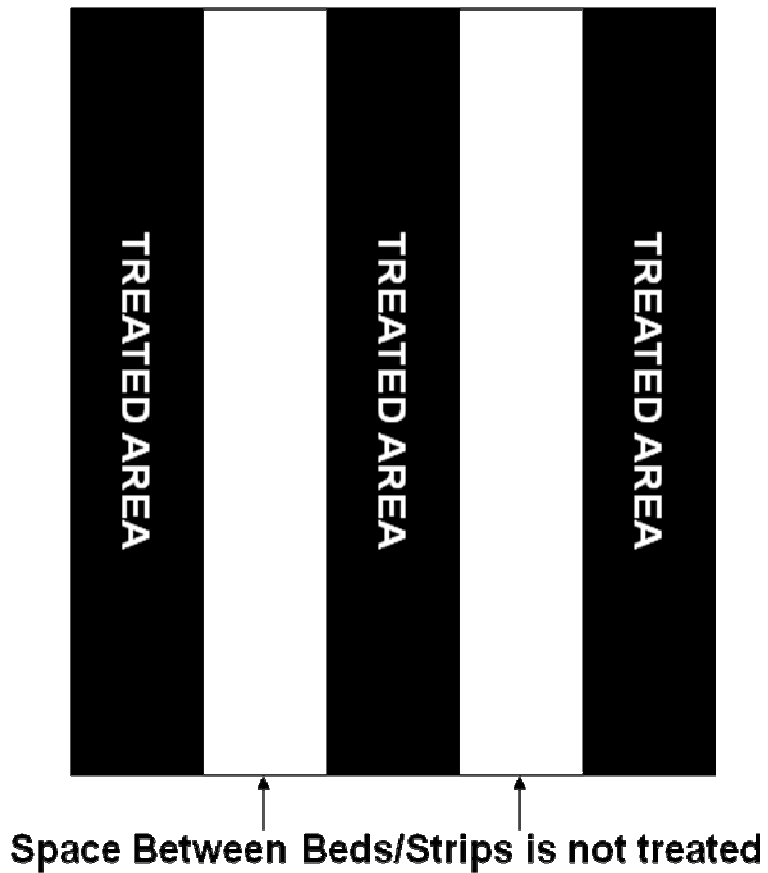
- pounds [or gallons] of product per treated acre
- strip or bed bottom width (inches)
- center-to-center row spacing (inches)
- application block size (acres)

Pounds [or gallons] of product **per treated acre** is the ratio of total amount of product applied

Figure 1. Bedded/Strip Application (1 acre application block)

to the size of the **total area treated** (i.e., the rate of product applied in the bed). For bedded or strip applications, the **total area treated** is the summation of the area (i.e., length x width) of each treated bed bottom or strip that is located within the application block as shown by the black areas in Figure 1 (e.g., black areas are 0.6A or 60% of the area within the application block). The area of the space between the beds/strips is not factored in the total area treated.

The **application block size** is the acreage within the perimeter of the fumigated portion of a field (including furrows, irrigation ditches, roadways). The perimeter of the application block is the border that connects the outermost edges of total area treated with the fumigant product.

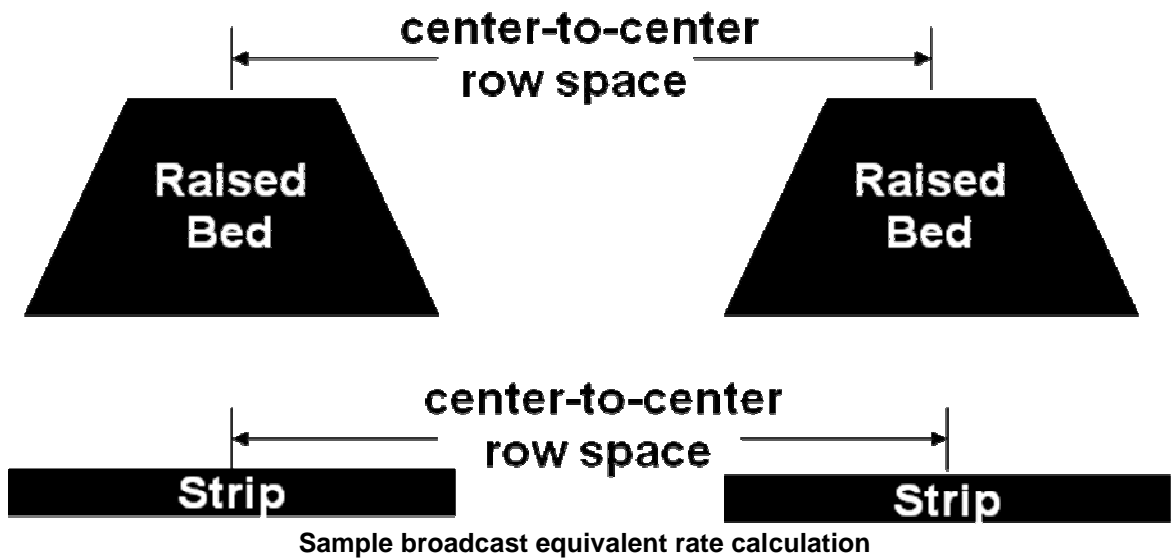


The “broadcast equivalent rate” must be calculated with the following formula:

$$\begin{array}{l}
 \text{broadcast equivalent rate} \\
 \text{(pounds [or gallons]} \\
 \text{product/acre)}
 \end{array}
 =
 \frac{\text{strip or bed bottom width} \\
 \text{(inches)}}{\text{center-to-center row} \\
 \text{spacing} \\
 \text{(inches)}}
 \times
 \begin{array}{l}
 \text{pounds or [gal} \\
 \text{product]} / \\
 \text{treated acre} \\
 \text{applied in the} \\
 \text{strip or bed}
 \end{array}$$

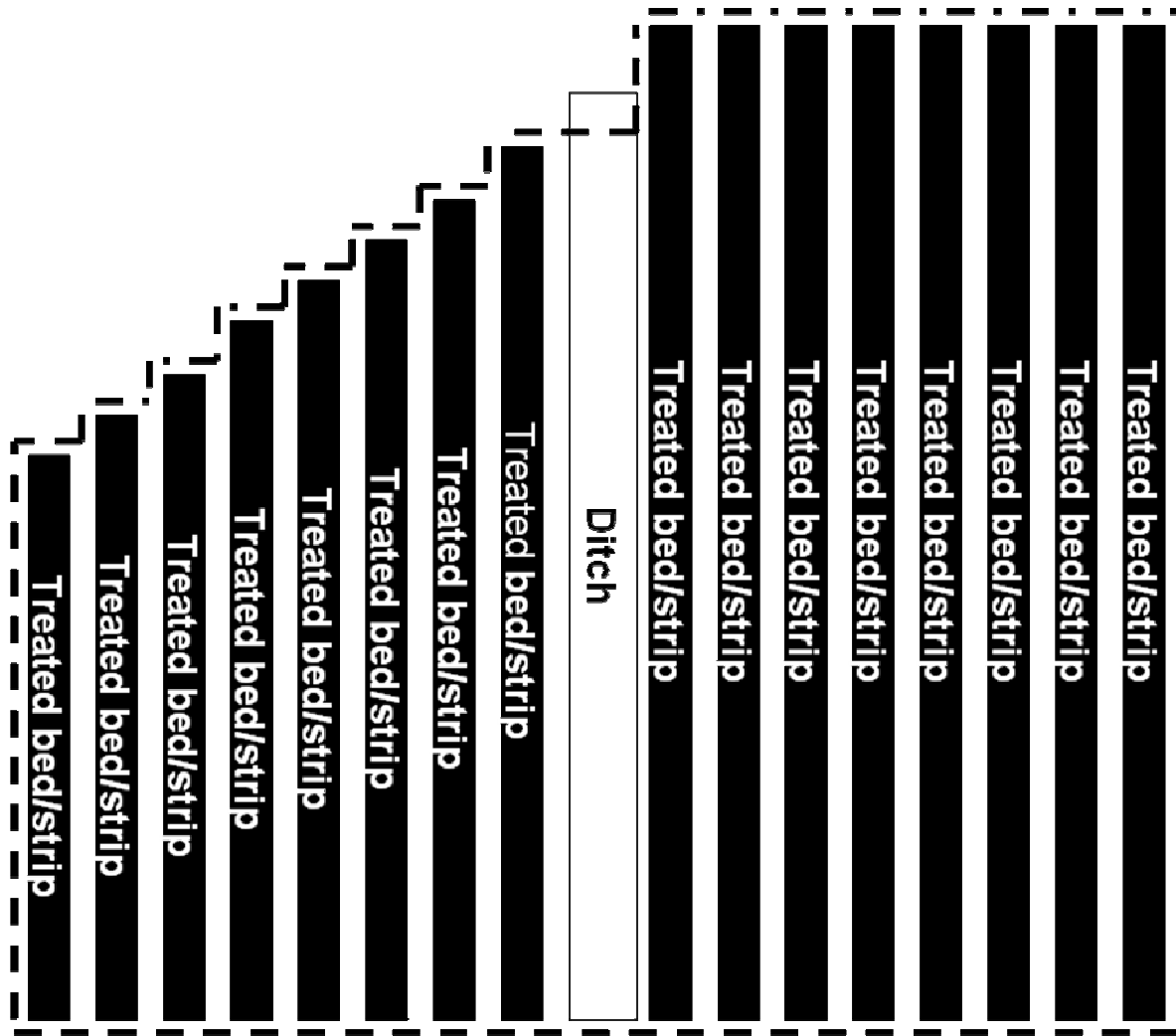
- The bed width must be measured from the bottom of bed.
- The center-to-center row spacing must be calculated as shown in Figure 2.
- If there are any ditches, waterways, drive rows and other areas that are not fumigated that are in the application block, multiply the above broadcast equivalent equation by **(total area of strips or beds + row spacing)/(application block size)**. A sample calculation is provided below.

Figure 2. Center Row Spacing



Assumptions:

- Application method is shank bedded
- Bed width is 30 inches (measured at the bottom of bed)
- Center-to-center row spacing is 60 inches
- 479 (max) pounds of product per treated acre is applied in the beds
- Total application block size is 10 acres
- Ditch in the middle of application block is 0.25 acres
- Area of beds + row spacing is 9.75 acres



$$\begin{aligned}
 & \text{broadcast equivalent rate (pounds product/acre)} \\
 & = \frac{\text{strip or bed bottom width (inches)}}{\text{center-to-center row spacing (inches)}} \times \frac{\text{area of strips or beds + row spacing application block size}}{\text{application block size}} \times \text{pounds product/treated acre applied in the bed} \\
 & = \frac{30 \text{ inch width beds}}{60 \text{ inch row spacing}} \times \frac{9.75 \text{ acres}}{10 \text{ acres}} \times 479 \text{ pounds product/treated acre} \\
 & = 233.5 \text{ pounds product/acre}
 \end{aligned}$$

Buffer Zone Requirements

A buffer zone must be established for every fumigant application. The following describes the buffer zone requirements:

- The buffer zone must extend outward from the edge of the application block perimeter equally in all directions.
- All non-handlers, including field workers, residents, pedestrians, and other bystanders, must be excluded from the buffer zone during the buffer zone period except for transit (see *Buffer Zone Exemption for Transit on Roadways*).
 - Local, state, or federal officials performing inspection, sampling, or other similar official duties are not excluded from the application block or the buffer zone by this labeling. The certified applicator supervising the application and the owner of the establishment where the

application is taking place are not authorized to, or responsible for, excluding those officials from the application block or the buffer zone.

- The buffer zone period begins at the start of the application and lasts for a minimum of 48-hours after the application is complete.

Buffer zone proximity

- Before the start of application, the certified applicator must determine whether their buffer zone will overlap any DMDS buffer zone(s).
- To reduce the potential for off-site movement from multiple fumigated fields, buffer zones from multiple DMDS application blocks must not overlap UNLESS:
 1. A minimum of 12 hours have elapsed from the time the earlier application(s) is complete until the start of the later application, and
 2. *Fumigant Site Monitoring or Response Information for Neighbors* have been implemented if there are any residences or businesses within 300 feet of any of the buffer zones.

Structures under the control of the owner of the application block

- Buffer zones must not include buildings used for storage (e.g., sheds, barns, garages) UNLESS:
 1. The storage buildings are not occupied during the buffer zone period, and
 2. The storage buildings do not share a common wall with an occupied structure.

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

- Buffer zones must not include residential areas (e.g., employee housing, private property), buildings (e.g., commercial, industrial), outdoor residential areas (e.g., lawns, gardens, play areas) and other areas that people may occupy, UNLESS:
 1. The occupants provide written agreement, prior to the start of the application, that they will voluntarily vacate the buffer zone during the entire buffer zone period, and
 2. Reentry by occupants and other non-handlers must not occur until,
 - The buffer zone period has ended, and
 - Sensory irritation is not experienced upon re-entry.
- Buffer zones must not include agricultural areas owned and/or operated by persons other than the owner of the application block, UNLESS:
 1. The owner of the application block can ensure that the buffer zone will not overlap with a DMDS buffer zone from any other property owners, except as provided in the *Buffer Zone Proximity* section, and
 2. The owner of the other property provides written agreement to the applicator that they, their employees, and other persons will stay out of the buffer zone during the entire buffer zone period.
- Buffer zones must not include roadways and rights of way UNLESS:
 1. The area is not occupied during the buffer zone period, and
 2. Entry by non-handlers is prohibited during the buffer zone period.

Buffer Zone Exemption for Transit on Roadways

Vehicular and bicycle traffic on public and private roadways through the buffer zone is permitted. (NOTE: Buffer zones are not permitted to include bus stops or other locations where persons wait for public transit.)

- For all other publicly owned and/or operated areas such as parks, sidewalks, permanent walking paths, playgrounds, and athletic fields, buffer zones must not include these areas UNLESS:
 1. The area is not occupied during the buffer zone period,
 2. Entry by non-handlers is prohibited during the buffer zone period, and
 3. Written permission to include the public area in the buffer zone is granted by the appropriate state and/or local authorities responsible for management and operation of the area.

Certified applicators must comply with all local laws and regulations.

See the *Posting* section for additional requirements that may apply.

Buffer Zone Distances

Buffer zone distances must be calculated using the application rate and the size of the application block.

- Buffer zone distances must be based on look-up tables in this labeling (25 feet is the minimum distance regardless of site-specific application parameters).
- Use Table 2 as appropriate for the methods of application to determine the minimum buffer distances. Round up to the nearest rate and block size, where applicable. Applications are prohibited for rates and block sizes that exceed what is presented in the buffer zone tables.
- The size of the buffer zone will be dependent on the following factors:
 - The number of field acres that are being treated with PALADIN® EC.
 - The pounds of PALADIN® EC that are being applied.
- To determine the size of the required buffer zone, refer to the BUFFER ZONE DISTANCE table.

Table 2. BUFFER ZONE DISTANCE TABLE
for
Raised Bed, Chemigation Applications
(buffers in feet)

Broadcast equivalent Application Rate lbs/A (gal/A)	Application Block Size (acres)									
	1	5	10	15	20	25	30	35	40	
112 (12.6)	25	25	25	25	25	25	25	25	25	30
118 (13.3)	25	25	25	25	25	25	25	25	35	45
121 (13.6)	25	25	25	25	25	25	25	25	35	50
130 (14.7)	25	25	25	25	25	30	35	55	70	
133 (15.0)	25	25	25	25	25	35	45	60	75	
136 (15.3)	25	25	25	25	25	35	45	65	80	
140 (15.8)	25	25	25	25	25	40	55	70	85	
143 (16.2)	25	25	25	25	25	45	60	75	90	
146 (16.5)	25	25	25	25	30	50	65	80	95	
152 (17.2)	25	25	25	25	40	60	75	90	105	
155 (17.5)	25	25	25	25	45	70	80	95	110	
162 (18.3)	25	25	25	30	55	75	90	105	120	
170 (19.2)	25	25	25	35	60	80	95	115	130	
180 (20.3)	25	25	25	40	70	90	105	125	140	
186 (21.0)	25	25	25	50	75	95	115	135	150	
190 (21.4)	25	25	30	55	80	100	120	140	155	
200 (22.5)	25	25	35	60	90	110	130	150	170	
205 (23.1)	25	25	35	65	95	115	135	155	175	
209 (23.6)	25	25	40	65	95	115	135	155	175	
212 (23.9)	25	25	40	70	100	120	140	160	180	
219 (24.7)	25	25	45	75	105	125	145	165	185	
228 (25.7)	25	25	50	80	110	135	155	175	195	
238 (26.8)	25	25	60	90	115	140	160	185	205	
249 (28.1)	25	25	65	95	120	145	165	190	210	
251 (28.3)	25	25	65	95	125	150	170	195	215	
260 (29.3)	25	25	70	100	130	155	180	200	220	
273 (30.8)	25	25	75	105	135	160	185	210	230	
282 (31.8)	25	25	75	110	140	165	190	215	240	
285 (32.2)	25	25	80	110	140	165	190	215	240	
288 (32.5)	25	25	80	110	140	165	190	215	240	
297 (33.6)	25	25	80	115	150	175	200	225	250	
300 (34.0)	25	25	80	115	150	175	200	225	250	

Note: Minimum allowable buffer zone is 25 feet

Posting Fumigant Buffer Zones

- Posting of a **buffer zone** is required unless there is a physical barrier that prevents bystander access to the buffer zone.
- Buffer Zone signs must be placed along or outside the perimeter of the buffer zone, at all usual points of entry and along likely routes of approach from areas where people not under the owner's control may approach the buffer zone.
 - Some examples of points of entry include, but are not limited to, roadways, sidewalks, paths, and bike trails.
 - Some examples of likely routes of approach include, but are not limited to, the area between a buffer zone and a roadway, or the area between a buffer zone and a housing development.
 - When posting, the certified applicator supervising the application must ensure compliance with all local laws and regulations.
- Buffer Zone signs must meet the following criteria:
 - The printed side of the sign must face away from the application block toward areas from which people could approach.
 - Signs must remain legible during the entire posting period and must meet the general standards outlined in the WPS for sign size, text size, and legibility (see 40 CFR §170.120).
 - Signs must be posted no sooner than 24 hours prior to the start of the application and remain posted until the buffer zone period has expired.
 - Signs must be removed within 3 days after the end of the buffer zone period.
 - Buffer Zone signs which meet the criteria above will be provided at points of sale for applicators to use. Templates may be downloaded from http://www.epa.gov/pesticides/reregistration/soil_fumigants/index.htm
 - The Buffer Zone signs must contain the following information:
 - The 'Do Not Walk' symbol
 - DO NOT ENTER/NO ENTRE,
 - Dimethyl Disulfide Paladin EC Fumigant BUFFER ZONE,
 - Contact information for the certified applicator in charge of the fumigation.

Exception: If multiple contiguous blocks are fumigated within a 14-day period, the entire periphery of the contiguous blocks' buffer zones may be posted. Buffer Zone signs must be posted no sooner than 24-hours prior to the start of the first application. The signs must remain posted until the last buffer zone period expires and signs must be removed within 3 days after the buffer zone period for the last block has expired.

Restrictions for Difficult to Evacuate Sites

Difficult to evacuate sites are pre-K to grade 12 schools, state licensed daycare centers, nursing homes, assisted living facilities, hospitals, in-patient clinics, and prisons.

- No fumigant application with a buffer zone greater than 300 feet is permitted within 1/4 mile (1320 feet) of difficult to evacuate sites unless the site is not occupied by children from state-licensed day care centers, students (pre-K to grade 12), patients, or prisoners during the application and the 36-hour period following the end of the application.
- No fumigant application with a buffer zone of 300 feet or less is permitted within 1/8 mile (660 feet) of difficult to evacuate sites unless the site is not occupied by children from state-licensed day care centers, students (pre-K to grade 12), patients, or prisoners during the application and the 36-hour period following the end of the application.

Emergency Preparedness and Response Measures

If the buffer zone is 25 feet, then the *Emergency Preparedness and Response Measures* are not applicable.

Triggers for Emergency Preparedness and Response Measures:

The certified applicator must either follow the directions under the *Fumigant Site Monitoring* section or follow the directions under the *Response Information for Neighbors* section if:

- the buffer zone is greater than **25 feet** but less than or equal to **100 feet**, and there are residences or businesses within **50 feet** from the outer edge of the buffer zone, or
- the buffer zone is greater than **100 feet** but less than or equal to **200 feet**, and there are residences or businesses within **100 feet** from the outer edge of the buffer zone, or
- the buffer zone is greater than **200 feet** but less than or equal to **300 feet**, and there are residences or businesses within **200 feet** from the outer edge of the buffer zone, or
- the buffer zone is greater than **300 feet** or the **buffer zones overlap**, and there are residences or businesses within **300 feet** from the outer edge of the buffer zone.

Fumigant Site Monitoring

NOTE: *Fumigant Site Monitoring* is ONLY required if the *Emergency Preparedness and Response Measures* are triggered AND directions from the *Response Information for Neighbors* section are not followed.

From the start of the application until the buffer zone period expires, a certified applicator or handler(s) under his/her supervision must:

- Monitor for garlic-like odor or sensory irritation in areas between the buffer zone outer perimeter and residences and businesses that trigger this requirement.
- Monitoring for garlic-like odor or sensory irritation must begin in the evening on the day of application and continue until the buffer zone period expires. Monitor a minimum of 8 times during the buffer zone period, including these periods:
 - 1 hour before sunset,
 - during the night,
 - 1 hour after sunrise, and
 - during daylight hours.

Implement the emergency response plan immediately if a handler monitoring experiences sensory irritation.

Response Information for Neighbors

NOTE: *Response Information for Neighbors* is ONLY required if the *Emergency Preparedness and Response Measures* are triggered AND directions from the *Fumigant Site Monitoring* section are not followed.

The certified applicator supervising the application must ensure that residences and businesses that trigger the requirement have been provided the response information at least **1 week** before the application starts. The information provided may include application dates that range for no more than **4 weeks**. If the application does not occur when specified, the information must be delivered again.

Information that must be included:

- The location of the application block.
- Fumigant(s) applied including the active ingredient, name of the fumigant product(s), and the EPA Registration number.
- Contact information for the applicator and property owner.
- Time period in which the application is planned to take place (must not range more than 4 weeks).
- Early signs and symptoms of exposure to the fumigant(s) applied, what to do, and who to call if you believe you are being exposed (911 in most cases).
- How to find additional information about fumigants.

The method used to share the response information for neighbors can be accomplished through mailings, door hangers, or other methods that will effectively inform the residences and businesses within the required distance from the edge of the buffer zone.

Notice to State and Tribal Lead Agencies

If your state and/or tribal lead agency requires notice, information must be provided to the appropriate state or tribal lead agency prior to the application. Please refer to www.epa.gov/fumigantstaternotice for a list of states and tribal lead agencies that require notice and information on how to submit the information.

The information that must be provided to state and tribal lead agencies includes the following:

- Location of the application blocks,
- Fumigant(s) applied including EPA registration number,
- Applicator and property owner contact information, and
- Time period that fumigation may occur.

Emergency Response Plan

The certified applicator must include in the FMP a written emergency response plan that identifies:

- Evacuation routes,
- Locations of telephones,
- Contact information for first responders and local/state/federal/tribal personnel, and
- Emergency procedures/responsibilities (e.g., adding water to the field, repairing tarps, fixing equipment, evacuating upwind) if:
 - there is an incident,
 - sensory irritation is experienced outside of the buffer zone, and/or
 - there are equipment/tarp/seal failure or complaints, or other emergencies.

Site-Specific Fumigation Management Plan (FMP)

Prior to the start of application, the certified applicator supervising the application must verify that a site-specific FMP exists for each application block. In addition, an agricultural operation fumigating multiple application blocks may format the FMP in a manner whereby all of the information that is common to all the application blocks is captured once, and any information unique to a particular application block or blocks is captured in subsequent sections.

The FMP must be prepared by the certified applicator, the site owner, registrant, or other party.

The certified applicator supervising the application must verify in writing (sign and date) that the site-specific FMP(s) reflects current site conditions before the start of application.

Each site specific FMP must contain the following elements:

- Certified Applicator Supervising the Application
 - Name,
 - Phone number,
 - Pesticide applicator license and/or certificate number,
 - Specify if commercial or private applicator,
 - Employer name,
 - Employer address, and
 - Date and location of completing EPA approved soil fumigant training program
- General site information
 - Application block location (e.g., county, township-range-section quadrant), address, or global positioning system (GPS) coordinates
 - Name, address, and phone number of application block owner
 - Site map, aerial photo or detailed sketch showing:
 - application block location
 - application block dimensions
 - buffer zone dimensions
 - property lines

- roadways
 - rights-of-ways
 - sidewalks
 - permanent walking paths
 - bus stops
 - nearby application blocks
 - surrounding structures (occupied and non-occupied)
 - locations of Buffer Zone signs, and
 - locations of difficult to evacuate sites within ¼ mile of the application block if the buffer zone is greater than 300 feet, or 1/8 mile if the buffer zone is 300 feet or less.
 - Comments
- General application information
 - Target application date/window,
 - Fumigant Product Name, and
 - EPA registration number.
- Tarp Plan
 - Schedule for checking tarps for damage, tears, and other problems,
 - Minimum size of damage that will be repaired,
 - Factors used to determine when tarp repair will be conducted,
 - Equipment/methods used to perforate tarps,
 - Target dates for perforating tarps, and
 - Target dates for removing tarps.
- Soil conditions
 - Description of soil texture in application block,
 - Description of soil moisture and method used to determine soil moisture, and
 - Soil temperature measurement if air temperatures were above 100°F in any of the 3 days prior to the application.
- Buffer zones
 - Tarp Information
 - Tarp brand name
 - Lot number
 - Thickness
 - Manufacturer
 - Batch number
 - Part number
 - Color
 - Application method,
 - Injection depth,
 - Application rate from lookup table on label,
 - Application block size from lookup table on label,
 - Buffer zone distance, and
 - Description of areas in the buffer zone that are not under the control of the owner of the application block. If buffer zones extend onto areas not under the control of the owner, attach the written agreement and keep it with the FMP.
- Record Emergency Response Plan as described in the *Emergency Response Plan* section.
- Posting of Fumigant Treated Area and Buffer Zone
 - Person(s) who will post and remove (if different) Fumigant Treated Area and Buffer Zone signs, and
 - Location of Buffer Zone signs.
- Emergency Preparedness and Response Measures (if applicable)
 - Fumigant site monitoring (if applicable):
 - When and where it will be conducted
 - Response information for neighbors (if applicable):
 - List of residences and businesses informed,
 - Name and phone number of person providing information, and
 - Method of providing the information.
- State and/or tribal lead agency advance notification (if state and/or tribal lead agency requires notice, provide a list of contacts that were notified and date notified)

- Plan describing how communication will take place between the certified applicator supervising the application, the owner, and other on-site handlers (e.g., tarp perforators/removers, irrigators) for complying with label requirements (e.g., buffer zone location, buffer zone start and end times, timing of tarp perforation and removal, PPE).
 - Name and phone number of persons contacted by the certified applicator, and
 - Date contacted.
- Handler (including Certified Applicators) Information and PPE
 - Names, addresses and phone numbers of handlers
 - Names, addresses, and phone numbers for employers of handlers
 - Tasks that each handler is authorized and trained to perform
 - Date of PPE training for each handler
 - Applicable handler PPE including:
 - Long-sleeved shirts/long pants, shoes, socks
 - Chemical-resistant footwear
 - Protective eyewear (not goggles)
 - Chemical-resistant gloves
 - Air-purifying respirators
 - Respirator make, model, type, style, size, and cartridge/canister type,
 - Other PPE
 - For handlers: Confirmation of receipt of Fumigant Safe Handling Information.
 - For handlers designated to wear air-purifying respirators:
 - date of medical qualification to wear a respirator,
 - date of respirator training, and
 - date of fit-testing for the respirator.
 - Unless exempted in the *Protection of Handlers* section, verify that:
 - at minimum 2 handlers have the appropriate respirators and cartridges/canisters during handler activities, and
 - the employer has confirmed that the appropriate respirator and cartridges/canisters are immediately available for each handler who will wear one.
 - If using an enclosed cab in lieu of wearing an air-purifying respirator, verify that the cab:
 - Has positive pressure (6 mm H₂O Gauge).
 - Has a minimum air intake flow of 43 m³/hour.
 - Is equipped with activated charcoal filter-media containing no less than 1000 grams of activated charcoal.
 - Document the application hours of the filter to confirm that the filter has been used for no more than 50 hours of application time.
 - In addition document that the ventilation system has been maintained according to manufacturer's instructions.
- Air monitoring plan
 - If garlic-like odor is detected, indicate whether operations will cease or operations will continue with use of an air-purifying respirator
 - For monitoring the breathing zone:
 - Representative handler tasks to be monitored,
 - Monitoring equipment to be used, and
 - Timing of the monitoring.
- Good Agricultural Practices (GAPs)
 - Identify (e.g., list, attach applicable label section) applicable mandatory GAPs.
- Ensure that labels and MSDS are on-site and readily available for employees to review.

Record-Keeping Procedures

The owner of the application block as well as the certified applicator supervising the application must keep a signed copy of the site-specific FMP for 2 years from the date of application.

For situations where an initial FMP is developed and certain elements do not change for multiple application blocks (e.g., applicator information, certified applicator, handlers, record-keeping procedures, emergency procedures) only elements that have changed need to be updated in the site-specific FMP provided the following:

- The certified applicator supervising the application has verified that those elements are current and applicable to the application block before it is fumigated.

- Record-keeping requirements are followed for the entire FMP (including elements that do not change).

The certified applicator must make a copy of the FMP immediately available for viewing by handlers involved in the application. The certified applicator or the owner of the application block must provide a copy of the FMP to any local/state/federal/tribal enforcement personnel who request the FMP. In the case of an emergency, the FMP must be made immediately available when requested by local/state/federal/tribal emergency response and enforcement personnel. The certified applicator supervising the application must ensure the FMP is at the application block during all handler activities.

Within 30 days after the application is complete, the certified applicator supervising the application must complete a Post-Application Summary.

Post-Application Summary

The Post-Application Summary must contain the following elements:

- Actual date and time of the application
- Application rate
- Size of application block
- Weather Conditions
 - Summary of the National Weather Service weather forecast during the application and the 48-hours after the application is complete including:
 - wind speed, and
 - air stagnation advisory (if applicable).
 - Forecast must be checked on the day of, but prior to the start of the application, and on a daily basis during the application if the time period from the start of the application until the application is complete is greater than 24 hours.
- Tarp damage and repair information (if applicable):
 - Date of tarp damage discovery,
 - Location and size of tarp damage,
 - Description of tarp/tarp seal/tarp equipment failure, and
 - Date and time of tarp repair completion.
- Tarp perforation/removal details (if applicable):
 - Date and time tarps were perforated,
 - Date and time tarps were removed, and
 - Record if tarps were removed early. Describe the conditions that caused early tarp removal.
- Complaint details (if applicable):
 - Person filing complaint (e.g., on-site handler, person off-site),
 - If off-site person, name, address, and phone number of person filing complaint, and
 - Description of control measures or emergency procedures followed after complaint.
- Description of incidents (including date and time), equipment failure, or other emergency and emergency procedures followed (if applicable).
- Communication between applicator, owner and other on-site handlers (if applicable)
 - Record additional dates persons were contacted
- Air monitoring results:
 - Date(s), time(s) and location(s) of odor detection, hourly sample to determine if the odor is still detectable or air sample measurement with the direct read detection device detected,
 - Handler name and task/activity,
 - Air concentration measurement with direct read detection device (if applicable)
 - Resulting action (e.g., cease operations, continue operations with air-purifying respirators).
- Drip application monitoring
 - Record monitoring date(s) and time(s)
 - Name of person(s) monitoring
 - Record observations:
 - Is the equipment functioning properly,
 - Description of corrective action (if applicable), and
 - Other comments.

- Fumigant Treated Area and Buffer Zone Signs:
 - Dates of posting and removal.
- Any deviations from the FMP (e.g., changes in emergency response actions, changes in handler information, changes in handlers responsible for completing emergency tasks).

Record-Keeping Procedures

The owner of the application block, as well as the certified applicator supervising the application, must keep a signed copy of the Post-Application Summary for 2 years from the date of application.

SPILL AND LEAK PROCEDURES

- Refer to the *Personal Protective Equipment* section for Applicators and other handlers when handling liquid for spills and leaks.
- Cease all operations if any leak develops in the fumigation system.
- Evacuate everyone from the immediate areas of the spill or leak.
- Approach the area from the upwind side. Work upwind to repair leak(s), if possible.
- Only correctly trained and PPE-equipped handlers are permitted to enter. Do not permit entry into the spill or leak area by any other person until the garlic-like odor of this product is no longer detectable or sampling has verified that the DMDS concentration is below 55 ppb.
- Allow spilled fumigant to evaporate or to absorb onto vermiculite, dry sand, earth, or similar absorbent material. Such material should be disposed of on site or at an approved disposal facility.

STORAGE AND DISPOSAL

Do not contaminate water, food, or feed by storage or disposal

Refillable container. Refill this container with dimethyl disulfide only. Do not reuse this container for any other purpose. Cleaning the container before final disposal is the responsibility of the person disposing of the container. Cleaning before refilling is the responsibility of the refiller.

PESTICIDE HANDLING: Ensure all containers are bonded and grounded during filling, transferring or emptying operations.

PESTICIDE STORAGE: Store in well-ventilated area away from heat and sources of ignition such as flame, sparks, and static electricity. Do not store near or with oxidizers. Store only in areas that are authorized for flammable material storage. Cylinder storage must be in an area as designated by local and State requirements. Make certain cylinder tops are closed and cylinder remains in an upright position. Store only in original containers.

PESTICIDE DISPOSAL: Pesticide wastes are acutely hazardous. Improper disposal of excess pesticide or rinsate is a violation of federal law. If these wastes cannot be disposed of by use according to label instructions, contact your state pesticide or environmental control agency, or hazardous waste representative at the nearest EPA regional office for guidance.

CONTAINER HANDLING: Refillable container. Refill this container with dimethyl disulfide or PALADIN® products only. Return used cylinders or containers to the place of purchase, as directed on container or by container supplier/distributor. Container must never be refilled by the consumer or used for any other product or purposes. **For cylinder return** (1) The valve protection bonnet and safety cap should be removed only when fumigant is about to be removed from the cylinder. The safety cap and valve protection bonnet must be replaced when the cylinder is not in use. (2) Cylinders should never be subjected to rough handling or to abnormal mechanical shock such as dropping, bumping, dragging or sliding. (3) Ropes, slings, hooks, tongs and similar handling devices should not be used for unloading cylinders. (4) A suitable hand truck, fork truck, or similar device to which the cylinders can be firmly secured should be used for transporting the heavier cylinders. If cylinder retains any unused material and there are no further requirements for the product, contact the

distributor representative for return instructions. **For container return**, ensure all valves are closed and valve openings are capped and sealed. For further instructions contact your distributor.

EMERGENCY TELEPHONE NUMBERS:

CHEMTREC: (800) 424-9300

MEDICAL: (866) 767-5089 (Rocky Mountain Poison Control Center)

CONDITIONS OF SALE AND LIMITATION OF WARRANTY AND LIABILITY

The Directions for Use of this product must be followed carefully. It is impossible to eliminate all risks inherently associated with the use of this product. Crop injury, ineffectiveness or other unintended consequences may result because of such factors as manner of use or application, weather or crop conditions, presence of other materials, resistant strains or other influencing factors in the use of the product. To the extent consistent with applicable law, all such risks shall be assumed by Buyer and User, and Buyer and User agree to hold Arkema Inc., Manufacturer and Seller harmless for any claims relating to such factors. TO THE EXTENT CONSISTENT WITH APPLICABLE LAW, ARKEMA INC. AND MANUFACTURER MAKE NO WARRANTIES OF MERCHANTABILITY OR OF FITNESS FOR PARTICULAR PURPOSE NOR ANY OTHER EXPRESS OR IMPLIED WARRANTY EXCEPT AS STATED ON THIS LABEL.

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