



U.S. ENVIRONMENTAL PROTECTION AGENCY  
 Office of Pesticide Programs  
 Registration Division (7505P)  
 1200 Pennsylvania Ave., N.W.  
 Washington, D.C. 20460

EPA Reg. Number:

67799-3

Date of Issuance:

9/18/2018

NOTICE OF PESTICIDE:

Registration  
 Reregistration  
 (under FIFRA, as amended)

Term of Issuance:

Unconditional

Name of Pesticide Product:

Sea Fresh 150

Name and Address of Registrant (include ZIP Code):

Mary Beck  
 Seaco Technologies, Inc.  
 3220 Patton Way  
 Bakersfield, CA 93308

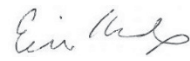
**Note:** Changes in labeling differing in substance from that accepted in connection with this registration must be submitted to and accepted by the Registration Division prior to use of the label in commerce. In any correspondence on this product always refer to the above EPA registration number.

On the basis of information furnished by the registrant, the above named pesticide is hereby registered/reregistered under the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA), as amended. Registration is in no way to be construed as an endorsement or recommendation of this product by the Agency. In order to protect health and the environment, the Administrator, on her/his motion, may at any time suspend or cancel the registration of a pesticide in accordance with the Act. The acceptance of any name in connection with the registration of a product under this Act is not to be construed as giving the registrant a right to exclusive use of the name or to its use if it has been covered by others.

EPA received a label amendment request submitted by email on 08/08/2018. EPA grants this request under the authority of section 3(c)(5) of FIFRA, as amended. With this accepted labeling, all requirements set forth in the Reregistration Eligibility Decision for Sulfur Dioxide have been satisfied. Therefore, EPA reregisters the product listed above. This action is taken under the authority of section 4(g)(2)(c) of FIFRA, as amended. Reregistration under this section does not eliminate the need for continual reassessment of pesticides. EPA may require submission of data at any time to maintain the registration of your product.

Submit one (1) copy of final printed labeling. Amended labeling will supersede all previously accepted labels. A copy of your label stamped "Accepted" is enclosed for your records. Products shipped after 12 months from the date of this Notice or the next printing of your label, whichever occurs first, must bear the new revised label.

Signature of Approving Official:

  
 Erik Kraft, Product Manager 24  
 Fungicide & Herbicide Branch, Registration Division (7505P)

Date:

9/18/2018

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EPA Reg. No. 67799-3  
Decision No. 386247

If these conditions are not complied with, the registration will be subject to cancellation in accordance with FIFRA section 6. Your release for shipment of the product constitutes acceptance of these conditions. A stamped copy of the label is enclosed for your records.

Please also note that the record for this product currently contains the following CSFs:

- Basic CSF dated 06/24/2003

If you have any questions, please contact Erik Kraft by phone at (703) 308-9358, or via email at [kraft.erik@epa.gov](mailto:kraft.erik@epa.gov).

## RESTRICTED USE PESTICIDE

Due to corrosive effects during inhalation and to eyes and skin.  
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 Certifications.

**ACCEPTED**

09/18/2018

Under the Federal Insecticide, Fungicide and Rodenticide Act as amended, for the pesticide registered under EPA Reg. No. 67799-3

# SEA♣FRESH 150

COMPRESSED SULFUR DIOXIDE

READ AND UNDERSTAND THE ENTIRE LABEL  
BEFORE USING THIS PRODUCT

ACTIVE INGREDIENT Sulfur Dioxide.....100%

KEEP OUT OF REACH OF CHILDREN

**DANGER PELIGRO**



**POISON**



Si usted no entiende la etiqueta, busque a alguien para que se la explique a usted en detalle

See inside label booklet for additional Precautionary Statements and Directions for Use including Storage and Disposal Instructions

### FIRST AID

- |                         |   |
|-------------------------|---|
| If Inhaled              | - Move person to fresh air<br>- If person is not breathing, call 911 or ambulance, then give artificial respiration, preferably mouth to mouth, if possible.<br>- Call a poison control center or doctor for further treatment or advice  |
| If on skin or Clothing. | - Remove contaminated clothing.<br>- Rinse skin immediately with plenty of water for 15-20 minutes.<br>- Call a poison control center or doctor for treatment or advice.  |
| If in eyes              | - Hold eye open and rinse slowly and gently with water for 15-20 minutes.<br>- Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye.<br>- Call a poison control center or doctor for treatment advice. |
| If swallowed            | (LIQUID SULFUR DIOXIDE)<br>- Have person sip a glass of water if able to swallow.<br>- Do not induce vomiting unless told to do by a poison control center or doctor.<br>- Do not give anything by mouth to an unconscious person.        |

### HOT LINE NUMBER:

Have the product container or label with you when calling a poison control center or Doctor or going for treatment. In the event of a medical emergency, you may also contact the National Pesticide Information Center (NPIC) at 800 858-7378

**NOTE TO PHYSICIAN:** Probable mucosal damage may contraindicate the use of gastric lavage.

# **SEA FRESH 150**

## **SULFUR DIOXIDE INSTRUCTIONS BOOKLET**

### **PRECAUTIONARY STATEMENTS**

Hazard to Humans and Domestic Animals

### **DANGER**

Corrosive. Fatal if swallowed. Fatal if absorbed through skin. Fatal if inhaled. Causes irreversible eye damage. Causes skin burns. Do not get in eyes, on skin, or on clothing. 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.

### **PERSONAL PROTECTIVE EQUIPMENT**

Wear protective eye wear (goggles, face shield, safety glasses), supplied-air respirator with NIOSH approval number prefix TC-19C or a self-contained breathing apparatus (SCBA) with NIOSH approval number TC-13F, coveralls over long sleeved shirt and long pants, chemical resistant footwear, socks and chemical resistant gloves. When mixing and loading, wear a chemical resistant apron. For overhead exposure, wear chemical resistant headgear. When cleaning equipment, add a chemical resistant apron. When making gas applications or checking connections, wear a NIOSH/MSHA approved full face respirator with an organic-vapor removing cartridge, in addition to sulfur dioxide impervious gloves, boots and coveralls over long-sleeved shirt and long pants. If a sulfur dioxide concentration of 2ppm is exceeded at any time, all persons working in the fumigation area must wear a NIOSH/MSHA approved full face respirator with an organic-vapor removing cartridge. If sulfur dioxide concentrations of 10 ppm are exceeded, or when concentrations are unknown, an approved self-contained breathing mask (SCBA) or combination air supplied SCBA respirator must be used by all persons working in the fumigation area. Before moving or using this product, handlers must be trained how to appropriately use respirators which conform to OSHA requirements (described in 29 CFR Part 1910.124 and how to appropriately handle and use sulfur dioxide.

## USER SAFETY RECOMMENDATIONS

- User should wash hands before eating, drinking, chewing gum, using tobacco, or using the toilet.
- User should remove clothing/PPE immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing.
- Users should 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:

THIS PRODUCT IS TOXIC TO FISH AND WILDLIFE. Do not spill or empty into streams, ponds, or any other body of water. Do not contaminate water or wetlands by cleaning of equipment, disposal of wastes, or direct application.

### PHYSICAL AND CHEMICAL HAZARDS:

Sulfur Dioxide is a non-flammable, whitish colored gas of pungent odor. Corrosive in presence of water. Do not spray water on any leaking container. Water will make product corrosive and may increase venting. Sulfur Dioxide can be sensed by taste at low level concentrations.

**SEA FRESH 150 (Sulfur Dioxide) is a hazardous liquid under pressure and is to be used and dispersed only by individuals trained by Seaco Technologies, Inc. This product is intended to be used only by Seaco personnel or under supervision and instruction of Seaco Technologies, Inc. It is advised that a minimum of two persons be present at all times from introduction of the fumigant through the aeration period. Read this entire booklet prior to use.**

## DIRECTIONS FOR USE

**READ ENTIRE LABEL BEFORE USING THIS PRODUCT. USE STRICTLY IN ACCORDANCE WITH LABEL PRECAUTIONARY STATEMENTS AND DIRECTIONS.**

**NOTICE TO USER:** It is a violation of Federal Law to use this product in a manner inconsistent with its labeling. This labeling must be in possession of the user at the time of the pesticide application. Before moving or using, handlers must be trained how to appropriately use respirators that conform to OSHA requirements (described in 29 CFR Part 1910.134) and how to appropriately handle and use sulfur dioxide. This product, including dispensing equipment, must be handled and used in accordance with the practices specified by all applicable product labeling.

**STORAGE AND DISPOSAL:  
DO NOT CONTAMINATE FOOD OR FEED BY STORAGE OR DISPOSAL.**

**PESTICIDE STORAGE** – STORE IN A SECURE LOCATION PROPERLY LABELED FOR CATEGORY I PESTICIDES. STORE CYLINDERS UPRIGHT, SECURED TO A RACK OR WALL OR PLACED IN SPECIALLY DESIGNED CASES TO PREVENT TIPPING. CYLINDERS MUST NOT BE SUBJECTED TO ROUGH HANDLING OR MECHANICAL SHOCK SUCH AS DROPPING, BUMPING, DRAGGING OR SLIDING. DO NOT USE ROPE, SLINGS, HOOKS, TONGS OR SIMILAR DEVICES TO UNLOAD CYLINDERS. DO NOT STORE NEAR FLAMMABLE MATERIAL, NEAR THE INLET OF A VENTILATING OR AIR CONDITIONING UNIT, NEAR ANY SOURCE OF DIRECT HEAT, NOR IN A SUBSURFACE LOCATION. BEFORE USE, LOCATE THE CYLINDER LABELED FOR THE ROOM TO BE FUMIGATED, WHICH WILL SHOW THE ROOM NUMBER AND WEIGHT OF SO<sub>2</sub> IN THE CONTAINER, MOVE THIS CONTAINER TO THE ROOM MATCHED TO THE CONTAINER FOR FUMIGATION. IF PRESENT, REPLACE VALVE HOOD AND VALVE OUTLET CAP WHEN NOT IN USE.

**PESTICIDE DISPOSAL** – PESTICIDE WASTES ARE ACUTELY HAZARDOUS. IMPROPER DISPOSAL OF EXCESS PESTICIDE, SPRAY MIXTURE OR RINSATE IS A VIOLATION OF FEDERAL LAW. IF THESE WASTES CANNOT BE DISPOSED OF ACCORDING TO LABEL INSTRUCTION, CONTACT YOUR STATE PESTICIDE OR ENVIRONMENTAL CONTROL AGENCY OR THE HAZARDOUS WASTE REPRESENTATIVE AT THE NEAREST EPA REGIONAL OFFICE FOR GUIDANCE.

**CONTAINER HANDLING** – REFILLABLE CONTAINER. REFILL THIS CONTAINER WITH SULFUR DIOXIDE ONLY. DO NOT REUSE THIS CONTAINER FOR ANY OTHER PURPOSE. WHEN CYLINDER IS EMPTY AFTER USE, CLOSE VALVE BY TURNING TO THE RIGHT UNTIL TIGHT, DISCONNECT LINES AND, IF PRESENT, REPLACE VALVE HOOD AND VALVE OUTLET CAP BEFORE RETURNING TO SUPPLIER. DO NOT USE CYLINDERS FOR ANY OTHER PURPOSE. ONLY SEACO TECHNOLOGIES, INC. IS AUTHORIZED TO REFILL CYLINDERS. AFTER CYLINDER IS EMPTY AND THE VALVES ARE CLOSED AND UNCOUPLED FROM THE SYSTEM, RETURN CYLINDER TO A SECURE LOCATION PROPERLY LABELED FOR CATEGORY 1 PESTICIDES. RETURN EMPTY AND/OR PARTIAL CYLINDERS ONLY AFTER CONSULTING SEACO TECHNOLOGIES, INC. FOR PROPER SHIPPING INSTRUCTIONS.

**SPILL AND LEAK PROCEDURE**

Immediately move unprotected personnel upwind. If the Sulfur Dioxide (Sea Fresh 150) container/cylinder is leaking, try to position it in an upright position so that gas, rather than liquid leaks. Using full protective equipment, apply emergency sealing device if

possible. Cover leak area with tarp or plastic sheet to limit spread of SEA FRESH 150. NEVER IMMERSE A LEAKING CONTAINER IN WATER.

SEA FRESH 150 (Sulfur Dioxide) can be deactivated with dilute solutions of soda ash, caustic soda, hydrated lime or sodium bicarbonate. Maintain alkaline pH during neutralization. Alkaline solutions must be oxidized before disposal due to their oxygen demand.

Dispose of any waste material at an approved waste disposal facility and in accordance with all applicable regulations. Do not dispose of waste materials in normal garbage or sewer system.

#### WAREHOUSE STORAGE & FUMIGATION:

Timing is crucial to ensure optimum results. The fumigation of grapes using SEA FRESH 150 MUST occur as soon after harvest as is possible.

Fruit that will be held for extended periods of time MUST be fumigated with SEA FRESH 150 on the same day as harvesting, within a 12 hour period and then followed with subsequent fumigation at 7-10 day intervals.

Fruit that is being shipped to markets soon after harvest, MUST be fumigated before initial transportation. Fruit held for shorter periods of time in preparation for shipping can be fumigated in transit if it has been fumigated no more than three times.

Seeded varieties of grapes must be fumigated every 7 to 10 days up to a total of 20 times. Seedless varieties MUST be fumigated using 7 to 10 day intervals up to 15 times and the Thompson Seedless grape should not be fumigated more than a total of 12 times total using 7 to 10 day intervals.

#### FOR POST HARVEST USE ON GRAPES HELD IN COLD STORAGE:

SEA FRESH 150 (Sulfur Dioxide) fumigation of grapes held in cold storage will suppress the spread of gray mold disease caused by Botrytis Cinerea. For optimum results:

1. Care is to be given to avoid bruising of fruit, crushing of berries or excess bunch shatter.
2. Do not allow liquid Sulfur Dioxide (Sea Fresh 150) to come in direct contact with fruit as bleaching will occur.
3. Apply only in closed stationary spaces such as fumigation, pre-cooling or cold storage rooms or transportation vehicles such as trucks, trailers, vans and railcars.
4. Commence fumigation in the following order:
  - a. Position palletized fruit in accordance with industry directions and those suggested in these directions in enclosed area. Packed boxes MUST be oriented to ensure that openings are aligned with openings of other packed boxes to promote optimum air flow. See Storage Room Fumigation, Traditional & Utilization Methods.
  - b. Using specified industry standards, determine quantity of sulfur dioxide needed for each particular application. **Use 3/4 to 1% gas concentration based on measured volume of the cold storage room or fumigation chamber. Initial treatment should last for 20 to 30 minutes starting when gas is first introduced into the room.**
  - c. Turn on fans, using an adequate number to ensure volatilization of all the sulfur dioxide and to permit a uniform concentration of fumigant throughout the closed area. Air volume is advised to be at least 0.5 times the volume of the fumigated space during each minute of gassing.
  - d. Firmly close all vents and ports into and out of the storage area prior to attaching Sulfur Dioxide (Sea Fresh 150) to hose system.
  - e. Attach Sulfur Dioxide (Sea Fresh 150) container/cylinder into the house hose system making certain hoses are directed into open, unrestricted areas.



- f. Ensure that safety placards are in place in accordance with the instructions under PLACARDING OF FUMIGATED WAREHOUSE AREAS.
- g. Vaporize Sulfur Dioxide (Sea Fresh 150) by opening valve all the way to the left and only after ensuring that all connections are tightly closed. Leave the valve open until the container is empty. Treatment MUST last 20 to 30 minutes and starts from the minute gas is initially admitted into the room.
- h. End fumigation period at the end of 30 minutes, or sooner, by venting or scrubbing the fumigated air from the enclosed area. This MUST be accomplished immediately following gassing to avoid excess residue. This will require sufficient air movement or replacement of air in the room at the rate of 0.1 to 0.3 of the cubic volume of the room per minute for an approximate 30 minute period. Fans MUST be periodically checked to ensure this rate of air movement. Water scrubbing systems must have sufficient surface to remove the Sulfur Dioxide (Sea Fresh 150) at the same rate as that of direct venting.
- i. Close valve on empty cylinder by turning to the right or clockwise direction prior to disconnecting hose lines. Replace protection bonnet and return empty cylinder to Seaco Technologies, Inc.
- j. End fumigation period at the end of 30 minutes, or sooner, by venting or scrubbing the fumigated air from the enclosed area. This MUST be accomplished in a 20 to 30 minute period. This will require sufficient air movement or replacement of air in the room at the rate of 0.1 to 0.3 of the cubic volume of the room per minute.
- k. Close valve on empty cylinder by turning to the right or clockwise direction prior to disconnecting End fumigation period at the end of 30 minutes, or sooner, by venting or scrubbing the fumigated air from the enclosed area. This MUST be accomplished in a 20 to 30 minute period. This will require sufficient air movement or replacement of air in the room at the rate of 0.1 to 0.3 of the cubic volume of the room per minute.
- l. Close valve on empty cylinder by turning to the right or clockwise direction prior to disconnecting hose lines.
- m. When treating grapes for Botrytis Cinerea (bunch rot/gray mold) or black widow spider in a warehouse fumigation chamber, do not release treated air into the atmosphere containing concentrations of sulfur dioxide in excess of 30 ppm (as determined by a Sensidyne or Kitagawa syringe sampler, or a Draeger handpump).

These directions, as well as, temperature control will provide for best results. To use less than the specified amounts of Sulfur Dioxide (Sea Fresh 150) may result in reduced efficacy

#### HIGH FREQUENCY - LOW DOSAGE TREATMENT- WAREHOUSE

It is essential, if using this method, that examination of fruit MUST be made at least once a week to determine if there is any evidence of mold growth. This inspection MUST be repeated for the duration of the storage time. For optimum results, follow directions given in FOR POST HARVEST USE OF GRAPES HELD IN COLD STORAGE with the following departures:

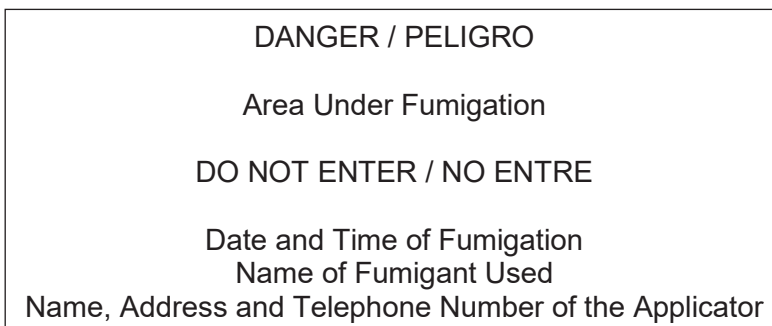
1. Initial fumigation MUST be ¾ to 1% of the gas concentration based on the measured volume of the cold storage room. This initial fumigation MUST occur within a 12 hour period after harvest. Treatment MUST continue until a room concentration level is determined by measurement to be less than 2.0ppm. Vigorous air movement is required during the fumigation process and for a 30 minute time period following the fumigation. No venting is required for this process.
2. Follow-up fumigation MUST proceed at the rate of 200 to 400 ppm gas concentration based on the measured volume of the cold storage room and at a frequency of three times per week (for example 2 days, 2 days and 3 days.)
3. A pre-weighed cylinder of SEA FRESH 150 (Sulfur Dioxide) will be supplied by Seaco Technologies, Inc. or their agents that has been filled for a predetermined measured room. The filling weight of the cylinder will be determined by the room size.
4. Connect the appropriate cylinder to a gassing system which has been inspected and approved by Seaco Technologies, Inc or their agents. Open the valve completely to the right. Leave the valve open until the cylinder is empty.
5. Close valve on empty cylinder by turning all the way to the left. Remove the cylinder from the gassing system. Replace protection bonnet and return empty cylinder to Seaco Technologies, Inc. or their agents.

**AERATION & RE-ENTRY TO FUMIGATED WAREHOUSE:**

After fumigation, treated areas must be aerated until the level of sulfur dioxide is below 2.0 ppm. This is determined by using a direct detection device (for example, a Gastec-Sensidyne Dosimeter Tube or for immediate readings, a Draeger hand pump and recommended detector tube or Kitagawa or Sensidyne syringe with recommended detection device). Do not allow anyone into the fumigation area until sulfur dioxide levels are measured below 2.0 ppm. Posted placards can be removed after SeaFresh 150 concentrations fall below the 2.0 ppm level in the treated area. It is important to note that any level more than 20 ppm is above capacity of rated gas masks and only self contained breathing devices can be used and only with proper training and instruction in its use. Even very brief exposure to 100 ppm is extremely hazardous to life and health.

**PLACARDING OF FUMIGATED WAREHOUSE AREAS:**

Before fumigation, all entrances to the fumigation area must be posted with signs that include the following information.



The words DANGER / PELIGRO need to be written in at least 2" letters for optimum visibility

If a treated commodity is moved to another location without aeration, the new site must be placarded until the air around the commodity is tested and determined to be below the threshold concentration of 2.0 ppm.

Entering the fumigation area while levels of sulfur dioxide exceed 2.0 ppm is not permitted without the required PPE. Please refer to RESPIRATORY PROTECTION AT HIGHER CONCENTRATION LEVELS IN FIRST AID SECTION.

#### DIRECTIONS FOR LOADING GRAPES FOR TRANSIT

A 48-foot-long trailer can accommodate wood or corrugated boxes stacked on 48 X 40-inch pallets to reach the 45,000 lb. shipping weight. Pallets MUST be pin-wheel loaded in order to maximize flow of air and minimize temperatures rising during transit. A 53-foot-long trailer would be needed in order to accommodate a full load of the 12 X 20" foam boxes. A load of all wood boxes MUST be loaded with their 40" side across the trailer from side to side. They can be side shifted against opposite trailer walls to prevent contact between boxes and trailer sides. All wood boxes will reach a maximum trailer weight prior to the trailer becoming full.

#### FUMIGATION OF TRAILERS

An approved hose kit MUST be installed in the trailer through the drain line at the end of the trailer and under the pallets. Detailed instructions for installing the hose kit are included in the container case for the kit. Close the trailer doors and insure placards are in place. Connect the SEA FRESH 150 container, which has been pre-weighed, to the hose end. Turn the cylinder upside down and open the valve for approximately 2 minutes or until empty. After the cylinder is emptied, close the valve completely and disconnect from the hose end. Return empty cylinders to Seaco Technologies, Inc.

Trailers fumigated with SEA FRESH 150 (Sulfur Dioxide) must be held for twenty-four (24) hours before being released for shipment. Transporting containers or vehicles under fumigation over public roads is prohibited.

#### FUMIGATION OF RAILCARS

An approved hose kit MUST be installed in the trailer through the drain line under the pallets which support the fruit. Detailed instructions for installing the hose kit are included in the container case for the kit. Close all doors/openings and ensure that the placards are in place. Connect the SEA FRESH 150 (Sulfur Dioxide) cylinder, which has been pre-weighed, to the hose end by turning the cylinder upside down and open the valve for approximately 2 minutes or until empty. After the cylinder is emptied, close the valve completely and disconnect from the hose end. Return empty cylinders to Seaco Technologies, Inc.

#### AERATION & RE-ENTRY TO FUMIGATED TRAILERS, VANS & RAILCARS:

If re-entry to a fumigated trailer or railcar is necessary after fumigation, treated areas must be aerated until the level of sulfur dioxide is below 2.0 ppm. This is determined by using a direct detection device (for example, a Gastec-Sensidyne Dosimeter Tube or for immediate readings, a Draeger hand pump and specified detector tube or Kitagawa or Sensidyne syringe with specified detection device). Do not allow anyone into the fumigation area until sulfur dioxide levels are measured below 2.0 ppm. Posted placards can be removed after SEA FRESH

150 (Sulfur Dioxide) concentrations fall below the 2.0 ppm level in the treated area. It is important to note that any level more than 20 ppm is above capacity of rated gas masks and only self contained breathing devices can be used and only with proper training and instruction in its use. Even very brief exposure to 100 ppm is extremely hazardous to life and health.

#### PLACARDING OF TRUCK, VAN & RAILCAR FUMIGATION AREAS:

Trucks and vans fumigated with sulfur dioxide must be held for 24 hours before being released for shipment. Transporting containers or vehicles under fumigation over public roads is prohibited.

All truck, van and railcars which are being used for fumigation must be placarded. The following MUST be included:

<p>DANGER/PELIGRO Need to be written in at least 2" letters for optimum visibility. TRAILER FUMIGATED WITH SULFUR DIOXIDE. DO NOT ENTER – NO ENTRE DATE &amp; TIME OF FUMIGATION.</p>
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In addition, a manifest must accompany each load.

The Applicator must show on the manifest which accompanies the load of produce that the trailer, van or railcar has been fumigated with Sulfur Dioxide.

The statement must include the following:

<p>DANGER / PELIGRO TRAILER FUMIGATED WITH SULFUR DIOXIDE Date and Time of Fumigation</p>
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The words, DANGER/PELIGRO, NEED TO BE WRITTEN IN AT LEAST 2" LETTERS for optimum visibility.

#### MEASURING AND MONITORING LEVELS OF SEA FRESH 150

The concentration of SEA FRESH 150 (Sulfur Dioxide) and the time of contact on the fruit are multiplied to achieve the CT (concentration X time). The concentration is measured in ppm (parts per million) and is multiplied by the amount of time of contact with the fruit.

Levels of SEA FRESH 150 (Sulfur Dioxide) up to 250 ppm-hour must be measured by dosimeter tube placed within boxes of fruit. Typically, these tubes must be placed in fruit contained in the hardest to fumigate areas of a given room. This would include center boxes as well as areas of reduced airflow. Dosimeter type tubes must be placed immediately prior to fumigation and read upon completion of fumigation. Higher concentration levels within the storage rooms must be measured using pump-type samplers. Infrared style analyzers must not be used on a regular basis due to difficulty in accurate calibrations. Maximum allowable levels of sulfur dioxide in initial fumigation is 10,000 ppm. Maximum allowable levels of sulfur dioxide in storage fumigation is 5,000 ppm.

Quantities of SEA FRESH 150 (Sulfur Dioxide) need to be monitored in each storage facility as follows:

Dosimeter Tubes must be placed in the center boxes on the pallets. Boxes must be monitored from at least three lanes of pallets at both the up and down wind ends of lanes along with high and low levels of elevation.

Frequently inspect the grapes taken from pallets that receive the highest and also the lowest concentrations of SEA FRESH 150. (Ordinarily these boxes would be closest to the air in-take and air returns). Frequently inspect the fruit in the center most boxes and in areas where airflow is compromised for any decay.

Monitor SEA FRESH 150 (Sulfur Dioxide) residues in fruit starting as early as possible in the storage facility. Highest percentages of residue will typically occur nearest the upwind end of the pallet rows and in outside top corner boxes. Any residues higher than 3ppm must be immediately reported to the supervisor.

### **INITIAL FUMIGATION - TRADITIONAL METHODS**

Circulating-air fumigation or forced-air fumigation can be used in combination with initial cooling or as a completely separate operation. The amount of SEA FRESH 150 needed can be determined using the following formula:

$$\text{Pounds SEA FRESH 150} = \frac{A \times V \times C}{10,000,000}$$

A = 1.67 at 70°F and 1.82 at 32°F

V = Room Volume (cubic feet)

C = SEA FRESH 150 concentration (ppm)

Concentration levels may also be determined by the percentage of SEA FRESH 150 in the given room. One percent SEA FRESH 150 is equivalent to 10,000 ppm (0.5 percent SEA FRESH 150 is equal to 5,000 ppm).

Maximum SEA FRESH 150 concentration level is 10,000 ppm for any initial fumigation. Dosimeter tubes placed in boxes must be used to determine proper penetration percentages.

Care must be given to ensure air speeds of at least 140 feet per minute if using circulating-air techniques to optimize maximum penetration of SEA FRESH 150 to the center placed pallets. In addition, proper aligning of liner vents and box vents are crucial to the success of the fumigation. In some instances, fruit wrapped in plastic bags and/or paper wrapping may reduce the penetration of sulfur dioxide.

Forced-air fumigation utilizes airflow systems much like forced-air cooling. The open areas between pallet rows must be covered with reinforced tarps to create a tunnel effect. Fans are needed to pull the air through the tunnel, allowing the room air in which SEA FRESH 150 has been added to penetrate the boxes. Typically, the excess SEA FRESH 150 is expelled from the room after thirty minutes.

It is important to note: Newly constructed facilities may not release any SEA FRESH 150 into the outside atmosphere. Existing facilities, as of the time of this writing, are not under the same restrictions. Where venting is regulated, water scrubbing equipment is typically used in which the SEA FRESH 150 laden air is forced through a water spray or

pad assembly process. Ten pounds of SEA FRESH 150 can be absorbed by 1400 gallons of water if the water is at 32°F. Warmer water temperatures are less effective. This water cannot be reused and must be disposed of in accordance with local, state and federal regulations. In some instances, sodium or potassium is used in the scrubbing water to increase it's ability to absorb the SEA FRESH 150 with the same waste water rules applying to it's disposal.

**INITIAL FUMIGATION – TOTAL UTILIZATION METHODS**

This method of fumigation can be used ONLY in conjunction with pre-cooling of the fruit. The actual fumigation is done simultaneously with the pre-cooling allowing complete absorption as the SEA FRESH 150 stays in contact with the fruit for extended periods of time. The storage rooms are prepared in the same manner as for forced-air fumigation and any related considerations apply.

An advantage of this method of fumigation is less SEA FRESH 150 is used to achieve more consistent levels of in-box CT levels in excess of 100 ppm-hours for all packaging types. An additional advantage would be concentration levels of 2 ppm or less at the end of the fumigation period necessitating less scrubbing of the SEA FRESH 150. If concentration levels, at the end of the fumigation period do happen to exceed 2 ppm, less SEA FRESH 150 can be used or an extension of the fumigation period may be necessary.

The factors for determining the amount of SEA FRESH 150 necessary to provide adequate decay control in initial fumigation may be calculated using the following formula:

Box Type	SEA FRESH 150 Factor (lbs./10,000 boxes)	
EPS	1.5	(or 3.0 if penetration is poor)(boxes @ 25lbs. gross)
TKV	3.7	(or 6.3 if penetration is poor)(boxes @ 25lbs. gross)

EPS (Expanded Polystyrene Boxes)      TKV (Technical Kraft Veneer Boxes)

Lower factors are recorded for Polystyrene boxes since they do not absorb SEA FRESH 150 as readily as other materials such as wood or fiberboard.

Examples of SEA FRESH 150 needed for an initial forced air fumigation using utilization methods for a room storing 10,000 boxes of fruit is as follows:

% of max. box storage capacity	SEA FRESH 150 required (depending on measured penetration)	
	EPS boxes	TKV boxes
20	.8 – 1.5	1.9 – 3.2
40	.8 – 1.5	1.9 – 3.2
50	.8 – 1.5	1.9 – 3.2
60	.9 – 1.8	2.2 – 3.8
80	1.2 – 2.4	3.0 – 5.0
100	1.5 – 3.0	3.7 – 6.3



Since rooms vary, each fumigation room needs to be calibrated to determine the appropriate quantity of SEA FRESH 150 needed to achieve a CT of 100 ppm-hours in packed boxes. SEA FRESH 150 levels must never be lower than that of a half full storage room.

**STORAGE ROOM FUMIGATION USING TRADITIONAL METHODS**

The maximum concentration of SEA FRESH 150 permitted in storage rooms is 5,000 ppm. Methods for fumigating are similar to that described in initial fumigation using traditional methods allowing for the lower 5,000 ppm. Optimally, a room is fumigated every seven days to control Botrytis on grapes held in storage and temperatures are maintained at 31°F.

**STORAGE ROOM FUMIGATION USING UTILIZATION METHODS**

Methods for storage room fumigation are similar to the initial fumigation utilization method except that the air is not forced past the pallet rows, but rather flows freely down the lanes. Typically, pallets are stacked two to three high with not less than four and no more than six inches separating the lanes. Methods for fumigating storage rooms are similar to that described in initial fumigation using utilization methods; however, SEA FRESH 150 levels are greater due to poorer penetration. The level of SEA FRESH 150 must never be less than that required for a half full room. Fumigation must be repeated at seven day intervals and temperatures maintained at 31°F.

The factors for determining the amount of SEA FRESH 150 necessary to provide adequate decay control in storage fumigation may be calculated using the following formula:

Box Type	SEA FRESH 150 Factor (lbs./10,000 boxes)	
EPS	3.0	(or 7.5 if penetration is poor)(boxes @ 25lbs. gross)
TKV	6.3	(or 14.0 if penetration is poor)(boxes @ 25lbs. gross)

Lower factors are recorded for Polystyrene boxes since they do not absorb SEA FRESH 150 as readily as other materials such as wood or fiberboard.

Examples of SEA FRESH 150 needed for forced air fumigation using utilization methods for a room storing 30,000 boxes of fruit is as follows:

% of max. box storage capacity	SEA FRESH 150 required (depending on measured penetration)	
	EPS boxes	TKV boxes
20	4.5 – 11.3	9.5 – 21.0
40	4.5 – 11.3	9.5 – 21.0
50	4.5 – 11.3	9.5 – 21.0
60	5.4 – 13.5	11.3 – 25.2
80	7.2 – 18.0	15.1 – 33.6
100	9.0 – 22.5	18.9 – 42.0

Since rooms vary, each fumigation room needs to be calibrated to determine the appropriate quantity of SEA FRESH 150 needed to achieve a CT of 100 ppm-hours in packed boxes. SEA FRESH 150 levels must never be lower than that of a half full storage room.

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