

[Container Label]

| | | |
|-------|----|-------------|
| GROUP | 1B | INSECTICIDE |
|-------|----|-------------|

MALATHION

Fyfanon® ULV

Ultra Low Volume Concentrate Insecticide

COMMERCIAL-AGRICULTURAL

SOLUTION

ACTIVE INGREDIENT:

Malathion..... 96.5 %

1 litre contains 1.15 kg of malathion

REGISTRATION NO. 9337 – PEST CONTROL PRODUCTS ACT

KEEP OUT OF REACH OF CHILDREN

READ THE LABEL AND ACCOMPANYING BOOKLET BEFORE USING

CAUTION

POISON

IN CASE OF EMERGENCY, CALL TOLL FREE, DAY OR NIGHT: 1-800-331-3148

NET CONTENTS : _____ L (up to Bulk)

NOTE : UNDILUTED SPRAY DROPLETS OF FYFANON ULV LIQUID INSECTICIDE WILL PERMANENTLY DAMAGE AUTOMOBILE PAINT UNLESS THESE SPECIFIC INSTRUCTIONS FOR GROUND AND AERIAL APPLICATION ARE FOLLOWED.

Registrant :
FMC of Canada Limited
6755 Mississauga Road,
Suite 204
Mississauga, ON L5N 7Y2
1-833-362-7722

Expiry Date: yyyy-mm-dd
Lot # XXXX-XXX-X

This product is not to be sold or applied after the expiry date above.

®FYFANON is a registered trademark of FMC Corporation or an affiliate

PRECAUTIONS:

KEEP OUT OF REACH OF CHILDREN

- DO NOT contaminate food, feed, fertilizers or seed.
- Hazardous if swallowed, inhaled or absorbed through skin.
- Avoid breathing spray mist.
- Avoid contact with skin, eyes or clothing.
Wash thoroughly with soap and water after handling.
- Remove contaminated clothing.
- DO NOT treat dairy barns.
- DO NOT apply to pastures while occupied by dairy animals.
- DO NOT treat any plants while in bloom. This product is also toxic to bees exposed to direct treatment or residues on crops. This product is toxic to fish. DO NOT contaminate any body of water by direct application, cleaning of equipment or disposal of waters and containers.

FIRST AID

IF ON SKIN OR CLOTHING: Take off contaminated clothing. Rinse skin immediately with plenty of water for 15–20 minutes. Call a poison control centre or doctor for treatment advice.

IF IN EYES: 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 eye. Call a poison control centre or doctor for treatment advice.

IF SWALLOWED: Call a poison control centre 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 centre or doctor. Do not give anything by mouth to an unconscious person.

IF INHALED: Move person to fresh air. If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably by mouth-to-mouth, if possible. Call a poison control centre or doctor for further treatment advice.

Take container, label or product name and Pest Control Product Registration Number with you when seeking medical attention.

TOXICOLOGICAL INFORMATION:

Symptoms of poisoning: headache, weakness, sweating, giddiness, blurred vision, nausea, abdominal cramps, diarrhea and discomfort in the chest. Treat symptomatically.

Antidote: If accidental poisoning occurs, atropine is antidotal. Pralidoxime chloride (2-PAM; PROTOPAM chloride) may be effective as an adjunct to atropine. For severe cases, administer 4 to 8 mg of atropine sulfate intravenously at intervals of 10 to 15 minutes until atropinization is achieved. For less severe cases, administer 2 to 4 mg intramuscularly at 30 minute intervals. When signs of full atropinization appear, reduce dosage and frequency to 1 mg every 2 to 4

hours. Full atropinization should be maintained for at least 24 hours from beginning of treatment. For children administer proportionately lower dosages based on body weight.

Malathion is an organophosphate that is a cholinesterase inhibitor. Typical symptoms of overexposure to cholinesterase inhibitors include headache, nausea, dizziness, sweating, salivation, runny nose and eyes. This may progress to muscle twitching, weakness, tremor, incoordination, vomiting, abdominal cramps and diarrhea in more serious poisonings. A life threatening poisoning is signified by loss of consciousness, incontinence, convulsions and respiratory depression with a secondary cardiovascular component. Treat symptomatically. If exposed, plasma and red blood cell cholinesterase tests may indicate degree of exposure (baseline data are useful). Atropine, only by injection, is the preferable antidote. Oximes, such as pralidoxime chloride, may be therapeutic if used early; however, use only in conjunction with atropine. In cases of severe acute poisoning, use antidotes immediately after establishing an open airway and respiration. With oral exposure, the decision of whether to induce vomiting or not should be made by an attending physician.

ENVIRONMENTAL PRECAUTIONS

TOXIC to bees exposed to direct treatment, drift, or residues on flowering crops or weeds. DO NOT treat any plants while in bloom. Minimize spray drift to reduce harmful effects on bees in habitats close to the application site.

TOXIC to certain beneficial insects. Minimize spray drift to reduce harmful effects on beneficial insects in habitats next to the application site such as hedgerows and woodland.

STORAGE

Store this product away from food or feed.

Do not contaminate water by storage.

Keep in original container during storage. Isomalathion, a toxic metabolite of malathion, forms when malathion product is stored at elevated temperatures or for extended periods of time.

Malathion product must be stored in a cool (< 23°C) dry, well ventilated place away from seed, fertilizer or other pesticides. Do not use after the expiry date given on the primary panel.

USE PRECAUTIONS

Apply only when the potential for drift to areas of human habitation or areas of human activity such as houses, cottages, schools and recreational areas is minimal. Take into consideration wind speed, wind direction, temperature inversions, application equipment and sprayer settings.

When used in residential areas, outdoor use only. Residential areas are defined as any use site where bystanders including children could be exposed during or after application. This includes homes, schools, public buildings or any other areas where the general public including children could be exposed.

For ULV Ground Applications:

Limit the amount of active ingredient handled per day to 95 kg per person (approx. 70 ha at a

rate of 1375 g a.i./ha, and 150 ha at a rate of 653 g a.i./ha).

Wear cotton coveralls over long pants, long sleeved shirts, and chemical-resistant gloves during mixing/loading, application, clean-up and repair.

For ULV Aerial Applications:

Limit the amount of active ingredient handled per day to 1125 kg per person (approx. 820 ha at a rate of 1375 g a.i./ha, and 1700 ha at a rate of 653 g a.i./ha).

Wear cotton coveralls over long pants, long sleeved shirts, and chemical-resistant gloves during mixing/loading, clean-up and repair.

DISPOSAL: (Disposable Containers)

- Triple or pressure-rinse the empty container. Add the rinsings to the spray mixture in the tank.
- Follow provincial instruction for any required additional cleaning of the container prior to its disposal.
- Make the empty container unsuitable for further use.
- Dispose of the container in accordance with provincial requirements.
- For information on the disposal of unused, unwanted product, contact the manufacturer or the provincial regulatory agency. Contact the manufacturer and the provincial regulatory agency in case of a spill, and for clean up of spills.

DISPOSAL: (Refillable Containers)

- After use, return cleaned container to the point of purchase or closest FMC warehouse. The container must only be refilled with Fyfanon ULV. Do not reuse container for any other purpose.
- Prior to refilling, inspect thoroughly for damage such as cracks, punctures, abrasions and damaged or worn out threads on closure devices. Check for leaks after refilling and before transportation.
- Do not refill or transport damaged or leaking containers. If the container is not being refilled, return to point of purchase.
- For information on disposal of unused, unwanted product, contact the manufacturer or the provincial regulatory agency. Contact the manufacturer and the provincial regulatory agency in case of a spill, and for clean up of spills.

NOTICE TO USER:

This pest control product is to be used only in accordance with the directions on the label. It is an offence under the *Pest Control Products Act* to use this product in a way that is inconsistent with the directions on the label.

[Booklet label]

| | | |
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ENVIRONMENTAL HAZARDS

TOXIC to bees exposed to direct treatment, drift, or residues on flowering crops or weeds. DO NOT treat any plants while in bloom. Minimize spray drift to reduce harmful effects on bees in habitats close to the application site.

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STORAGE

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USE PRECAUTIONS

Apply only when the potential for drift to areas of human habitation or areas of human activity such as houses, cottages, schools and recreational areas is minimal. Take into consideration wind speed, wind direction, temperature inversions, application equipment and sprayer settings.

When used in residential areas, outdoor use only. Residential areas are defined as any use site where bystanders including children could be exposed during or after application. This includes homes, schools, public buildings or any other areas where the general public including children could be exposed.

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Wear cotton coveralls over long pants, long sleeved shirts, and chemical-resistant gloves during mixing/loading, application, clean-up and repair.

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DISPOSAL: (Disposable Containers)

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- Prior to refilling, inspect thoroughly for damage such as cracks, punctures, abrasions and damaged or worn out threads on closure devices. Check for leaks after refilling and before transportation.
- Do not refill or transport damaged or leaking containers. If the container is not being refilled, return to point of purchase.
- For information on disposal of unused, unwanted product, contact the manufacturer or the provincial regulatory agency. Contact the manufacturer and the provincial regulatory agency in case of a spill, and for clean up of spills.

NOTICE TO USER:

This pest control product is to be used only in accordance with the directions on the label. It is an offence under the *Pest Control Products Act* to use this product in a way that is inconsistent with the directions on the label. The user assumes the risk to persons or property that arises from any such use of this product.

RESISTANCE MANAGEMENT

For resistance management, please note that Fyfanon ULV contains a Group 1B insecticide. Any insect population may contain individuals naturally resistant to Fyfanon ULV and other Group 1B insecticides. The resistant individuals may dominate the insect population if this group of insecticides are used repeatedly in the same fields. Other resistance mechanisms that are not linked to site of action but are specific for individual chemicals, such as enhanced metabolism, may also exist. Appropriate resistance-management strategies should be followed.

To delay insecticide resistance:

- Where possible, rotate the use of Fyfanon ULV or other Group 1B insecticides with different groups that control the same pests.
- Use tank mixtures with insecticides from a different group that is effective on the target pest when such use is permitted.
- Insecticide use should be based on an IPM program that includes scouting, record keeping, and considers cultural, biological and other chemical control practices.
- Monitor treated pest populations for resistance development.
- Contact your local extension specialist or certified crop advisors for any additional pesticide resistance-management and/or IPM recommendations for the specific site and pest problems in your area.
- For further information or to report suspected resistance, contact FMC at 1- 833-362-7722 or www.fmccrop.ca.

DIRECTIONS FOR USE

DO NOT contaminate irrigation or drinking water supplies or aquatic habitats by cleaning of equipment or disposal of wastes.

As this product is not registered for the control of pests in aquatic systems, **DO NOT** use to control aquatic pests.

Field sprayer application: **DO NOT** apply during periods of dead calm. Avoid application of this product when winds are gusty.

Aerial application: **DO NOT** apply when wind speed is greater than 16 km/h at flying height at the site of application.

Fyfanon ULV insecticide is used undiluted in specially designed aircraft or ground equipment capable of applying ultra low volumes for control of the insects indicated. **DO NOT** make

application when winds exceed 10-15 km/h.

Mist blowers and boom sprayers utilizing a controlled air flow to facilitate particle size and spray deposition may be used at a vehicle speed of 5-15 km/h.

For information concerning aircraft or ground application equipment suitable for applying the insecticide, contact FMC .

Before using, read the instructions contained in this pamphlet for the proper methods and procedures which must be followed to achieve effective insect control and avoid permanent damage to automobile and other paint finishes. Cars and trucks should not be sprayed directly. If accidental exposure does occur, the vehicle should be washed immediately.

TANK MIXES:

This product may be tank mixed with a fertilizer, a supplement, or with registered pest control products, whose labels also allow tank mixing, provided the entirety of both labels, including Directions For Use, Precautions, Restrictions, Environmental Precautions, and Spray Buffer Zones are followed for each product. In cases where these requirements differ between the tank mix partner labels, the most restrictive label must be followed. Do not tank mix products containing the same active ingredient unless specifically listed on this label.

In some cases, tank mixing pest control products can result in reduced pesticide efficacy or increased host crop injury. The user should contact FMC of Canada Limited at 1-833-362-7722 for information before applying any tank mix that is not specifically recommended on this label.

Aerial Application Instructions

Apply only by fixed-wing or rotary aircraft equipment which has been functionally and operationally calibrated for the atmospheric conditions of the area and the application rates and conditions of this label.

Label rates, conditions and precautions are product specific. Read and understand the entire label before opening this product. Apply only at the rate recommended for aerial application on this label. Where no rate for aerial application appears for the specific use, this product cannot be applied by any type of aerial equipment.

Ensure uniform application. To avoid streaked, uneven or overlapped application, use appropriate marking devices.

Use Precautions

Apply only when meteorological conditions at the treatment site allow for complete and even crop coverage. Apply only under conditions of good practice specific to aerial application as outlined in the National Aerial Pesticide Application Manual, developed by the

Federal/Provincial/Territorial Committee on Pest Management and Pesticides.

Do not apply to any body of water. Avoid drifting of spray onto any body of water or other nontarget areas. Specified spray buffer zones should be observed.

Coarse sprays are less likely to drift, therefore, avoid combinations of pressure and nozzle type that will result in fine particles (mist). Do not apply during periods of dead calm or when wind velocity and direction pose a risk of spray drift. Do not spray when the wind is blowing towards a nearby sensitive crop, garden, terrestrial habitat (such as shelter-belt) or aquatic habitat.

Operator Precautions

Do not allow the pilot to mix chemicals to be loaded onto the aircraft. Loading of premixed chemicals with a closed system is permitted.

It is desirable that the pilot have communication capabilities at each treatment site at the time of application.

The field crew and the mixer/loaders must wear chemical resistant gloves, coveralls and goggles or face shield during mixing/loading, cleanup and repair. Follow the more stringent label precautions in cases where the operator precautions exceed the generic label recommendations on the existing ground boom label.

All personnel on the job site must wash hands and face thoroughly before eating and drinking. Protective clothing, aircraft cockpit and vehicle cabs must be decontaminated regularly.

Product Specific Precautions

Read and understand the entire label before opening this product. If you have questions, call the manufacturer at 1-833-362-7722 or obtain technical advice from the distributor or your provincial agricultural representative.

Fyfanon ULV insecticide can be effectively applied with conventional aircraft spray equipment by making a few minor modifications to the plumbing and boom assembly.

Pump

Pumps capable of producing pressures of 275-350 kPa will be satisfactory. A bleed line, at least 5 mm in diameter should be installed on the high point of the impeller chamber to release trapped air. This line should bleed back to the top of the tank above the liquid level.

By-Pass

A by-pass is required from the spray pump outlet to the spray pump inlet. This line must be equal in diameter to the pump outlet and should contain a valve controllable from the cockpit that will permit adjustments of boom pressure in flight. The by-pass commonly used to recirculate

the insecticide to the spray tank must be closed to avoid aeration of the insecticide.

Boom and Nozzle Placement

The distance between the left and right outboard nozzles should be at least $\frac{3}{4}$ of the wing span. The total number of nozzles used should be equally spaced across this span if the aircraft is flown at six meters or higher. Trailing edge booms are desirable and the nozzles should be placed on boom where the pilot can readily see them to check for plugging during spray operation. A bleed line at least 5 mm in diameter should be attached to the outer end of each boom and routed back to the top of the spray tank but above the liquid level. This line will bleed off pressure and prevent sharp cut-off. If a nozzle is placed at each end of boom, as many Ag Cat spray booms are assembled, this bleed line is not necessary.

Mist blowers with a pump capable of producing up to 275 kPa and blower speeds of 2600 rpm are satisfactory. Use flat fan nozzles 8001 to 8002 placed 30° into air blast or rotary atomizers into the air blast that produce an efficient spray particle with a mass median diameter of 40 to 100 microns. The spray swaths must not exceed 10 meters in width, and no application should be made when the wind speed exceeds 8 km/h.

Boom sprayers with a filtered rotary air compressor, either PTO or gas engine driven or an air pump capable of producing at least 80 kPa are satisfactory. Use air pressure on chemical tanks and an accurate metering valve to assure a calibrated flow of the pesticide. Air should be regulated with relief valve and gauge for proper air and liquid mixture. Pneumatic-type spray nozzles, as suggested by equipment manufacturer, should be used for spray particles with mass median diameter of 30 to 100 microns. Applications should not be made when winds exceed 8 km/h.

Nozzles

Use at least 4 to 6 flat fan nozzles, such as Spraying Systems 8001, 80015, or 8002 for small aircraft such as Piper-Pawnees and Stearmans. For aircraft operating at 240 km/h or faster, use 10 to 14 8010 or 8015 flat fan nozzles. Nozzles should be pointed straight downward on small aircraft and straight back for faster aircraft. Use 100 mesh screens with 8001, 80015 and 8002 nozzles, and a large-volume 50-mesh screen should be used in the spray system. No screens are required for the 8010 or 8015 nozzles. Diaphragm check valves should be used on each nozzle to insure positive cut-off of spray during flight. Do not use cone nozzles.

Rotary atomizers, commonly known as Mini-Spin nozzles, developed by the Plant Pest Control Division, USDA, can be substituted for the flat fan nozzles. Use the same flat fan nozzle tips as mentioned above when using the Mini-Spin nozzles.

AGRICULTURAL USES

| CROP | PESTS CONTROLLED | mL/HA | DAYS TO HARVEST OR GRAZING | DIRECTIONS FOR USE |
|---|--------------------------------------|------------|----------------------------|---|
| Alfalfa (2 applications per cut to max 4 per year) | Alfalfa weevil larvae | 1100 mL | 5 | Apply when day temperatures are expected to exceed 18°C and when 50%-75% of the leaves show feeding damage. DO NOT apply to seed alfalfa or when alfalfa is in bloom. NO ground application. Maximum number of applications - 2 applications per cut to max 4 per year Minimum interval - 14 days |
| Cereal crops (barley, oats, wheat) - ULV AERIAL AND GROUND APPLICATIONS grasses or legumes grown for hay - ULV GROUND APPLICATION ONLY | Armyworms | 425-550 mL | 7 | Apply when larvae appear. Maximum number of applications per year – 1x |
| | Cereal leaf beetles | 275-550 mL | 7 | Maximum number of applications per year – 1x |
| Clover | Greenworms | 550 mL | 7 | DO NOT apply when clover is in bloom. Maximum number of applications per year – 2x Minimum interval – 14 days |
| Grass : Pasture and Range | Grasshoppers | 550-850 mL | 0 | ULV GROUND APPLICATION ONLY May be grazed or harvested on day of application. |
| | Houseflies, Stable flies, Mosquitoes | 425-550 mL | | Maximum number of applications per year – 1x |
| Canola | Diamondback moth larvae | 275-425 mL | 7 | Maximum number of applications per year – 1x |

Restricted-entry Intervals

| Activity | Restricted-entry Intervals REI |
|--|--------------------------------|
| cereal crops (barley, oats, wheat, grasses or legumes grown for hay), pasture and rangeland, canola (rapeseed, rape), alfalfa, clover, | |
| All activities | 12 hrs |

MOSQUITO AND FLY CONTROL

1. **AERIAL Ultra Low Volume Application** where Automobiles, Trailers, Trucks are present. Aerial spraying should not be attempted when the wind is at or above 15 km/h or temperatures are above 27°C. Undiluted spray droplets of Fyfanon ULV insecticide will permanently damage vehicle paint finishes unless the fixed wing aircraft used for the ultra low volume application meets all of the specifications listed below:

1. Aircraft is operated at 240 km/h or more.
2. There are no leaks in the ultra volume low spray system.
3. Nozzles are placed on the boom at a 40° angle down and into the wind.
4. Diaphragm check valves are used on all nozzles to insure positive cut-off of the spray.
5. Dosage of Fyfanon does not exceed 219 mL/ha when spraying where vehicles are present.
6. The spray system produces droplets of this product in the 50 to 60 mass median diameter (MMD) micron range, with no more than 10% of the droplets exceeding 100 microns, as determined by readings made from microscope slides coated with Dri-Film. See label section "Directions for Determining the Droplet Size".

In residential areas, rates must not exceed 260 g a.i./ha.

Residential areas are defined as sites where bystanders including children may be potentially exposed during or after spraying. This includes around homes, schools, parks, playgrounds, playing fields, public buildings or any other areas where the general public including children could be exposed.

Consult Provincial/Territorial pesticide regulatory officials for required authorization.

2. **GROUND EQUIPMENT Ultra Low Volume Application** of Nonthermal Aerosols.

NOTICE: FYFANON ULV INSECTICIDES SHOULD BE APPLIED ONLY BY TRAINED PERSONNEL OF MOSQUITO ABATEMENT DISTRICTS OR PEST CONTROL OPERATORS WHO HAVE THE KNOWLEDGE AND EXPERIENCE NECESSARY TO FOLLOW THE HIGHLY TECHNICAL AND SPECIFIC INSTRUCTIONS.

OPERATING EQUIPMENT

Each Nonthermal Aerosol Generator used for dispersal of Fyfanon ULV Insecticide to control adult mosquitoes should have minimum capability of producing the droplet spectrum described below under DROPLET SIZE. The initial determination of droplet size is made after the unit is

installed in a vehicle and prior to its use in mosquito control operations. The unit should be rechecked as frequently as necessary to insure that proper droplet size is maintained for each operation. Determination of droplet size every two months is usually sufficient if the unit has been maintained in good operating condition. Equipment manufacturer's instructions setting forth cleaning and maintenance of the unit must be followed. The unit must be inspected before each operation to correct any leaks or obstructions in the spray system; to detect whether the nozzle, hoses or other parts are worn and need replacement; to insure that the flow meter is properly calibrated; and to determine that the pressure recommended by the manufacturer is being maintained.

Flow rates : Adult Mosquito Control – For control of adult mosquitoes over a 100 m swath with nonthermal aerosols of Fyfanon using the ultra low volume method, use the following flow rates at the indicated vehicle speeds :

| Vehicle Speed km/h | Flow Rate of Fyfanon mL per minute |
|-----------------------|---------------------------------------|
| 8 | 30-60 |
| 15 | 60-120 |

Adult Stable Fly Control – For control of adult stable flies over a 100 m swath with nonthermal aerosols of Fyfanon ULV using the ultra low volume method, use the following flow rates at the indicated vehicle speeds :

| Vehicle Speed km/h | Flow Rate of Fyfanon mL per minute |
|-----------------------|---------------------------------------|
| 8 | 60 |
| 15 | 120 |

Flow Rate – must be regulated by accurate flow meter. The flow rate must be constantly monitored by the operator to maintain uniform control of the discharge rate.

Nozzle Direction – rear of the vehicle upward at an angle of 45° or more.

Vehicle Speed – not greater than 15 km/h; shut off spray equipment when vehicle is stopped.

IMPORTANT : Spray droplets of undiluted Fyfanon ULV insecticide will permanently damage automobile paint unless all the conditions described and recommended in this label are met.

Droplet Size

1. The mass median diameter (MMD) of the droplets should not exceed 17 microns. The MMD is the drop diameter which divides the spray volume into two equal parts; i.e., 50% of the volume are drop sizes below the MMD and 50% are above the MMD.
2. Spray droplets should not exceed 32 microns in size. Three percent of the spray droplets (6 droplets out of 200) can exceed 32 microns providing the MMD does not exceed 17 microns

and no droplets exceed a maximum of 48 microns. Larger droplets, when transported by natural air currents, impinge more readily on objects in their pathway and will permanently damage automobile-type paints.

3. More than one-half of the total spray mass should consist of droplets in the 6 to 18 micron range to achieve adequate dispersal of insecticide over a 100 meter swath.
4. A minimum of two-thirds, preferably four-fifths, of the total spray mass should consist of droplets not exceeding 24 microns in range.
5. Spray droplets should not be less than 5 microns in size as the smaller droplets do not impinge readily on adult mosquitoes.

DIRECTIONS FOR DETERMINING THE DROPLET SIZE OF FYFANON ULTRA LOW VOLUME NONTHERMAL AEROSOLS

Note – Other methods of determining droplet size may also be used. Such methods must first be validated by the user, to ensure droplet sizes are within label parameters. Permanent records of each droplet size determination must be kept and made available to FMC upon request.

Preparation of Slides

Fyfanon droplet sizes are determined by depositing a sample of the aerosol on a coated glass slide and measuring the droplets under a high-power microscope. Ordinary 75 x 25 mm glass slides must be coated with silicone (General Electric SC-87 Dri-Film) prior to sampling to prevent excessive spreading or coalescence of the droplets. The slides are dipped into a 10 percent solution of Dri-Film in toluene, drained and dried at about 95°C for 30 minutes, after which they are dipped in acetone, allowed to dry and stored in a tight slide box. Coating solution must be freshly prepared. Do not store coating solution because it will deteriorate. Slides are lightly polished with a soft tissue before using to remove any foreign particles.

Deposition of Fyfanon Droplets on Slides

Droplets should be collected under ideal operating conditions to insure representative sampling of droplets in the aerosol. A sample of the Fyfanon aerosol is deposited on a slide by passing the slide as rapidly as possible perpendicular through the aerosol cloud at a distance of 8 m from the point of discharge. The slide velocity may be increased by attaching it to a 1 – 1.5 meter stick by means of a spring paper clip. At least two slides should be exposed to insure an adequate sample. Store slides in a tight slide box for transfer to a location where measurements can be made. Avoid excessive heat during transit and store in a cool place until measurements can be made.

Although label specifications require the aerosol nozzle to be angled upward at 45° or more during operation, it is more convenient to position the nozzle parallel to the ground for droplet sampling. If this is not possible it will be necessary for it to be positioned at a sufficient height to obtain a representative sample of the aerosol.

Determination of Fyfanon Droplet Sizes

A microscope with mechanical stage and an eyepiece micrometer are used to determine the size of the individual aerosol droplet. Prior to taking measurements, the divisions of the eyepiece micrometer must be calibrated into microns by means of a stage micrometer. In the example represented in Table 1, droplets were measured at 400x magnification. At that magnification each division of the eyepiece was calibrated to equal 3.5 microns.

At least 200 droplets should be measured. Usually this is easily accomplished on one slide. An accurate method is to measure all droplets that pass through the micrometer scale as the slide is moved from one edge to the other by using the mechanical stage. Measurements should not be taken along the margins of the slide. It is more convenient to measure in terms of the divisions of the eyepiece micrometer and then convert these divisions into microns.

The measurements converted into microns must then be corrected for the amount of spread that occurred on the slides. The Fyfanon spread factor for silicone coated slides is 0.5. Therefore, in Table 1 each division of the eyepiece actually equals 1.75 microns (3.5 microns times the 0.5 spread factor).

The measurements are tabulated and processed as in Table 1. The Maximum Diameter is calculated by converting the diameter of the largest droplet measured into microns. In Table 1, the largest droplet measured had a diameter of 19 eyepiece divisions. Therefore, the Maximum Diameter is 33.3 microns (19 x 1.75 = 33.3).

To determine the Mass Median Diameter (MMD), the accumulative percentages from the last column in Table 1 are plotted against the eyepiece divisions (D) on arithmetic probability paper as in Figure 1. Directly across from the 50 percent point on the line is the median droplet size in eyepiece divisions which must be converted to microns. In Figure 1, 9.2 eyepiece divisions times the conversion factor of 1.75 equals a Mass Median Diameter of 16.1 microns.

Table 1 – Representative Count of Fyfanon ULV Droplets Impinged on Microscope Slides.

| Eyepiece Divisions (D)* | Number of Droplets | DxN | % of Total $\frac{DxN}{\sum (DxN)}$ | Accumulative Percentages |
|--------------------------------|---------------------------|------------|---|---------------------------------|
| 1 | 5 | 5 | 0.31 | 0.31 |
| 2 | 10 | 20 | 1.22 | 1.53 |
| 3 | 9 | 27 | 1.65 | 3.18 |
| 4 | 12 | 48 | 2.93 | 6.11 |
| 5 | 15 | 75 | 4.58 | 10.69 |
| 6 | 12 | 72 | 4.40 | 15.09 |
| 7 | 25 | 175 | 10.70 | 25.79 |
| 8 | 14 | 112 | 6.85 | 32.64 |

| | | | | |
|-------|-----|------|-------|-------|
| 9 | 28 | 252 | 15.40 | 48.04 |
| 10 | 19 | 190 | 11.61 | 59.65 |
| 11 | 14 | 154 | 9.41 | 65.06 |
| 12 | 10 | 120 | 7.33 | 76.39 |
| 13 | 6 | 78 | 4.70 | 81.16 |
| 14 | 4 | 56 | 3.42 | 84.58 |
| 15 | 11 | 165 | 10.09 | 94.67 |
| 16 | 2 | 32 | 1.96 | 96.63 |
| 18 | 2 | 36 | 2.20 | 98.83 |
| 19 | 1 | 19 | 1.16 | 99.99 |
| TOTAL | 199 | 1636 | | |

*Measurements were taken at 400x magnification. Each eyepiece division equals 1.75 microns (3.5 microns times the 0.5 spread factor).

Figure 1

Percentage of the total volume of aerosol samples below each stated droplet size (from Table 1). The Mass Median Diameter is determined from the 50 percent point on the line. The Mass Median Diameter (MMD) = 9.2 divisions times 1.75 = 16.1 microns.

