



AROSURF[®] MSF

**MONOMOLECULAR SURFACE FILM
FOR CONTROL OF MOSQUITO LARVAE AND PUPAE**

ACTIVE INGREDIENT: Poly(oxy-1,2-ethanediyl), α -isooctadecyl- ω -hydroxy, .100%
CAS NUMBER: 52292-17-8

EPA EST. NO. 42943-WI-1

EPA REG. NO. 42943-8

CAUTION KEEP OUT OF REACH OF CHILDREN

STATEMENT OF PRACTICAL TREATMENT

IF ON SKIN: Wash with plenty of soap and water. Get medical attention if irritation persists.

IF IN EYES: Flush with plenty of water. Get medical attention if irritation persists.

SEE SIDE PANEL FOR ADDITIONAL PRECAUTIONARY STATEMENTS

NOTICE: Sherex Chemical Co., Inc. makes no warranty, express or implied, of merchantability, fitness or otherwise concerning the use of this product other than as indicated on the label. User assumes all risks of use, storage or handling not in strict accordance with accompanying label

SHEREX CHEMICAL CO. INC. • DUBLIN, OH 43017 24-HOUR EMERGENCY PHONE: 614-890-5319



PRECAUTIONARY STATEMENTS

HAZARDS TO HUMANS AND DOMESTIC ANIMALS

CAUTION

Avoid contact with skin, eyes, or clothing. Wash thoroughly with soap and water after handling.

DIRECTIONS FOR USE

It is a violation of Federal law to use this product in a manner inconsistent with its labeling.

Refer to technical bulletin prior to use.

STORAGE AND DISPOSAL

PROHIBITIONS: Do not contaminate water, food, or feed by storage or disposal.

STORAGE: Do not allow water to stand on drum top for prolonged periods of time. Water may seep into drums (through weeping) and cause rust formation which may clog spray nozzles.

PESTICIDE DISPOSAL: Wastes resulting from the use of this product may be disposed of on site or at an approved waste disposal facility.

CONTAINER DISPOSAL: Triple rinse (or equivalent). Then offer for recycling or reconditioning, or puncture and dispose of in a sanitary landfill, or by other procedures approved by state or local authorities.

SPRAY TANK AND MIXING PRECAUTIONS

Thoroughly clean spray systems of contaminants such as petroleum oils, conventional toxicants, and detergent residues prior to the addition of technical AROSURF®MSF or when formulating AROSURF®MSF with water to prevent possible adverse product interactions and environmental effects. Detergents can act to destroy the film-forming properties of AROSURF®MSF. Diesel Oil + AROSURF®MSF + water can form a pasty unsprayable material.

Spray tanks should be free of water when using technical AROSURF®MSF in non-agitating systems.

Ground spray systems should be equipped with high sheer agitation (e.g. paddle) when adding AROSURF®MSF to water in spray tanks. Do not add AROSURF®MSF to water in spray systems that do not have agitation.

Premixing of AROSURF®MSF with water in high sheer agitation systems is required prior to addition to aircraft spray systems. Conventional by-pass recirculation will not provide adequate agitation to effectively mix AROSURF®MSF with water.

APPLICATION CONSIDERATIONS

AROSURF®MSF is not visible on the surface of the water. To check the habitat for the presence and persistence of AROSURF®MSF, add a drop of ADOL® Indicator Oil to several locations in the habitat, especially those downwind. If the drop of Indicator Oil forms a tight bead on the surface of the water, AROSURF®MSF is present.

Persistent unidirectional winds of 10 mph or greater, surface drainage overflow, or runoff will usually result in poor mosquito control due to displacement or removal of AROSURF®MSF from the habitat.

Mosquitoes that require little or no surface contacts for breathing, i.e., *Mansonia* spp., *Coquillettidia* spp., *Culex erraticus*, *Culex pilosus*, etc. require properly timed applications at sensitive (surface contacting) stages—the pupae to emerging adult—for maximum impact. The high end of the dosage range is recommended.

The high end of the dosage range is recommended when spraying habitats whose surface characteristics are severe (highly obstructed) to compensate for loss of AROSURF®MSF on vegetation or floating debris and to ensure adequate persistence and effective spreading/re-spreading.

The high end of the dosage range is recommended when spraying habitats where multi-directional winds of 10 mph or greater are expected to persist for 24 hours after treatment to ensure adequate persistence and effective spreading/re-spreading.

Significant expansion of the water's surface area from rain or tidal fluxes after the application can be compensated by a dosage that is based on the expected water surface area. This will help assure adequate AROSURF®MSF persistence and will eliminate the need for the re-treatment of mosquito broods resulting from the new water.

Application of 0.75-1.0 gal/acre can be useful in controlling *Culex* spp. in dynamic (continuous breeding) permanent habitats such as sewage treatment systems. These higher applications prolong film life and thus extend the interval between re-treatment.

Mosquito Habitat		Recommended Application Rates* (Gal/Surface Acre) According to Developmental Stage	
Description	Examples	Larvae	Pupae
Semi-permanent or permanent fresh (including potable and irrigation sources) or salt water habitats with no, low, moderate or high concentrations of emergent or surface vegetation.	Salt-marshes, ponds, storm water retention/detention basins, roadside ditches, grassy swales, pot holes, fields, reservoirs, irrigated croplands, etc.	0.3 - 0.5	0.2 - 0.3
Semi-permanent or permanent polluted water habitats containing no, low, moderate or high concentrations of algal mats, emergent or surface vegetation or organic/inorganic debris.	Pumping station bunkers, settling, polishing, and evapo-percolation ponds of sewage treatment systems; drainage areas containing effluent from slaughter houses, etc.	0.4 - 0.5	0.2 - 0.3

NOTE: LARVICIDAL ACTION WILL USUALLY RESULT IN 24-72 HOURS. PUPICIDAL ACTION WILL USUALLY RESULT IN 24 HOURS. REAPPLY AS NECESSARY.

*AROSURF®MSF may also be applied at the recommended rates in water-based formulations at up to 10 percent by volume.

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Registration Division
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INTRODUCTION

AROSURF MSF (Monomolecular Surface Film) is a non-petroleum, surface-active oil that is highly effective in controlling the larval and pupal stages of most species of mosquitoes. When applied to a mosquito habitat in low dosages, AROSURF MSF spontaneously and rapidly spreads over the surface of the water to form an ultra-thin film, approximately one molecule in thickness. This film does not kill mosquitoes by the toxic actions characteristic of other larvicides. Instead it exerts a unique physical impact on mosquito populations that cause larvae, pupae, and emerging adults to drown. Since this kill mechanism is physical in nature, AROSURF MSF is not expected to induce resistance in mosquitoes.

- History

The applicability of monomolecular surface film as a potential mosquito control agent was discovered in 1976 by the U.S. Naval Research Laboratory and the Navy Disease Vector Ecology and Control Center as a spin-off of basic research on the use of monomolecular organic surface films for the containment of small oil spills. In 1979, the Lee County Mosquito Control District, Fort Myers, Florida, initiated a cooperative project with the U.S. Naval Research Laboratory to determine if these materials could be used effectively in operational mosquito control programs. Extensive laboratory and field studies indicated that AROSURF MSF was the most effective product for controlling a broad spectrum of mosquitoes, in their natural aquatic breeding habitats, at low surface dosages, and under a wide range of environmental conditions.

PHYSICAL AND CHEMICAL PROPERTIES

AROSURF MSF is an ethoxylated fatty alcohol belonging to the chemical class of compounds known as nonionic surfactants. It is the two mole ethoxylate of isostearyl alcohol [-poly(oxy-1,2-ethanediyl),alpha-isooctadecyl-omega-hydroxy-]. Its physical characteristics include:

APPEARANCE	Clear light amber liquid, at 77°F (25°C) essentially odorless
ACTIVITY	100%
MOISTURE	1% maximum
DENSITY	0.9118 77°F/77°F (25°C/25°C)
WEIGHT	7.59 #/gallon, 77°F (25°C)
FLASH POINT	395°F (202°C)
MELTING POINT	19° to 27°F (-7 to -3°C)
WATER SOLUBILITY	Essentially insoluble, 2.5 ppm
PHOTODEGRADABLE	No
VISCOSITY	64-70 cps at 72°F (22°C)
BOILING POINT	608°F (320°C)
SURFACE TENSION	Reduces S.T. of clean water to 28.2 dyns/cm at 77°F (25°C)

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ADVANTAGES OF AROSURF MSF

AROSURF MSF's advantages over conventional larvicides and petroleum-based larviciding oils (such as diesel oil) for mosquito control programs are:

- EFFECTIVE AT LOW SURFACE DOSAGES
- BREAKS DOWN BY BACTERIAL ACTION
- BROAD SPECTRUM OF ACTIVITY
- NON VOLATILE
- TARGET ORGANISMS UNLIKELY TO DEVELOP RESISTANCE
- PRACTICAL TO APPLY BY CONVENTIONAL TECHNIQUES
- GOOD STORAGE STABILITY (SHELF LIFE)
- BASED UPON RENEWABLE RESOURCES
- USEFUL AGAINST LARVICIDE RESISTANT POPULATIONS
- COST COMPETITIVE AND EFFICIENT
- CAN BE APPLIED TO POTABLE WATER HABITATS

TOXICOLOGY AND NON-TARGET EFFECTS

AROSURF MSF belongs to the alcohol ethoxylate group of surfactants which have been routinely used in detergent and cosmetic products for over 20 years. The human health and environmental effects of alcohol ethoxylates have been extensively documented. Alcohol ethoxylates are characterized as having relatively weak biological activity and have not been identified with any adverse human health or environmental effects.

- Mammal

The results of acute animal testing demonstrate that AROSURF MSF has a low order of toxicity. The Oral (rat) LD₅₀ is greater than 20,000 mg/kg, the product is non-mutagenic (Ames test), and the dermal LD₅₀ is in excess of 2,000 mg/kg. Eye irritation studies on rabbits indicate no corneal opacity with irritation effects being reversible within 7 days. Primary skin irritation studies on rabbits indicate that the material is irritating, but the effects are reversible. However, when similar primary skin irritation tests were conducted on guinea pigs, only slight irritation was noted.

Studies on closely related fatty acid and fatty alcohol ethoxylates having various degrees of ethoxylation include a 2-year dog study with no-observed-effect level (NOEL) of 50,000 ppm (1,250 mg/kg); a 2-year rat study with a NOEL of 20,000 ppm (1,000 mg/kg); a 2-year rat study with a NOEL of 20,000 ppm (1,000 mg/kg); a 10-month monkey study with a NOEL of 1,000 mg/day.

- Non-Target Organisms - Bioassays

Extensive bioassays conducted on a variety of non-target organisms indicate that Arosurf MSF is one of the most desirable pesticides available for control of mosquito larvae and pupae. Bioassays on the following test organisms were submitted and accepted for fulfilling registration requirements:

Birds

Anatidae <u>Anas platyrhynchos</u>	Mallard Duck
Phasianidae <u>Colinus virginianus</u>	Bobwhite Quail

Fish

Cyprinodontidae <u>Cyprinodon variegatus</u>	Sheepshead Minnow
Salmonidae <u>Salmo gairdneri</u>	Rainbow Trout
Centrarchidae <u>Lepomis macrochirus</u>	Bluegill

Mollusks

Ostreidae <u>Crassostrea Virginica</u>	Oyster Larvae
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Crustaceans

Daphnidae <u>Daphnia magna</u>	Daphnia
Mysidae <u>Mysidopsis bahia</u>	Mysid Shrimp

MODE OF ACTION

AROSURF MSF kills mosquitoes by the physicochemical modification of the water interface of the habitat. Its mode of action is dependent upon the presence (persistence) of the surface film on the habitat. Under various conditions, this unique mechanism can be used to kill all or certain developmental stages in the life cycle of some species of mosquitoes.

Modification of the physical properties of the water surface interferes with the normal activities and development of mosquito larvae, pupae, and emerging adults. The surface film kills larvae, pupae, and adults in various stages of emergence by disrupting their

normal growth and development physiology, including resting, breathing and molting at the air-water interface. Also, increased wetting of tracheal (breathing) structures leads to drowning (suffocation).

AROSURF MSF can entrap and drown ovipositing (egg-laying) females and resting males of certain species upon contact with the surface film.

AROSURF MSF can wet, sink, and inhibit the eclosion (hatching) of floating eggs and egg rafts of some species of mosquitoes, when high pressure spray application is used.

AROSURF MSF can, therefore, exert ovicidal, larvicidal, pupicidal and adulticidal impact on natural mosquito populations. This spectrum of activity and mode of action makes AROSURF MSF unique among other mosquito larvicides on the market today.

SPEED OF ACTION

AROSURF MSF can control 1st to 4th instar larvae of most species of mosquitoes within 24 hours after treatment (acute kill); however, UNDER MOST FIELD CONDITIONS, EFFECTIVE CONTROL WILL USUALLY OCCUR WITHIN 48-72 HOURS AFTER TREATMENT (DELAYED KILL). Generalizations on larval instar sensitivity cannot be made from field tests. The rate of larval mortality is related to mosquito species, instar, development within an instar, habitat oxygen levels, habitat surface characteristics, habitat water temperature, and wind speed and direction. Molting of larvae to late instars or to pupae in habitats having high AROSURF MSF pressure was reported in certain cases of delayed mortality. In addition, some reports indicate that larval development can be arrested in a particular instar for prolonged periods under high film pressure before death occurs. In general, when development is arrested by AROSURF MSF, the mortality rate increases with time.

AROSURF MSF control of larvae and pupae is usually more rapid in mosquito habitats having a high water temperature (85-90°F; 29-32°C) and subjected to little or no wind. A species-dependent relationship between the rate of AROSURF MSF induced larvicidal action and the dissolved oxygen levels of a mosquito habitat was reported, i.e., the lower the dissolved oxygen the faster the kill. Low water temperature (less than 70°F; 21°C), windy conditions, and high dissolved oxygen levels will usually result in delayed larval mortality.

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AROSURF MSF kills pupae faster than it kills larvae, usually within 24 hours after treatment. Fourth instar larvae of Anopheles spp. exhibited sensitivity similar to pupae.

DEVELOPMENT OF RESISTANCE

AROSURF MSF kills mosquitoes by physical rather than by toxic action. Multigenerational challenge tests against larvae of laboratory-reared Culex quinquefasciatus indicate that no resistance of mosquitoes to AROSURF MSF is expected to develop from continuous field applications. Therefore, AROSURF MSF is expected to be useful in controlling vector and nuisance mosquitoes currently resistant to mosquito larvicides.

SPECTRUM OF ACTIVITY

AROSURF MSF can be used to kill all species of mosquitoes having frequent contacts with the air-water interface. Species of mosquitoes having minimal surface contacts such as Coquillettidia spp., Mansonia spp., Culex erraticus, and Culex pilosis will require specialized surface film approaches that are keyed to the presence of the surface-sensitive pupal and emerging adult stages.

AROSURF MSF has been shown to kill larvae and/or pupae (i.e., 90-100%) of the following species of mosquitoes under a variety of natural situations:

<u>Species</u> ¹	<u>Habitats</u>	<u>Location</u>
<u>Aedes aegypti</u>	Discarded tires	Florida
<u>Aedes taeniorhynchus</u> *	Coastal and inland salt marshes	Florida
<u>Aedes sollicitans</u>	Coastal salt marshes	Florida
<u>Aedes infirmatus</u>	Grassy fields	Florida
<u>Aedes nigromaculis</u>	Grassy fields, pastures	California
<u>Aedes melanimon</u>	Grassy fields, pastures	California
<u>Aedes canadensis</u>	Woodland pools	New Jersey
<u>Aedes stimulans</u>	Woodland pools	New Jersey
<u>Aedes vexans</u>	Grassy fields	Florida
<u>Anopheles quadrimaculatus</u> *	Marshy ponds	Florida
<u>Anopheles crucians</u> *	Marshy ponds	Florida
<u>Anopheles atropos</u>	Salt marshes	Florida
<u>Culex quinquefasciatus</u> *	Sewage treatment systems, polluted effluent	Florida

<u>Culex nigripalpus*</u>	Sewage treatment systems, grassy fields, roadside ditches, storm water retention ponds, discarded tires	Florida
<u>Culex salinarius</u>	Marshes, grassy fields	Florida
<u>Culex tarsalis</u>	Standing ponds	California
<u>Psorophora columbiae*</u>	Grassy fields, pastures roadside ditches	Florida
<u>Psorophora ciliata*</u>	Grassy fields, pastures roadside ditches	Florida
<u>Psorophora ferox</u>	Wooded fields	Florida
<u>Psorophora howardji</u>	Grassy fields	Florida
<u>Uranotaenia lowii*</u>	Sewage treatment systems	Florida
<u>Uranotaenia sapphirina</u>	Marshy ponds	Florida

¹Control of larvae was generally shown to be acute or delayed; however, control of pupae was acute.

*Tests by helicopter and ground spray equipment - all other tests by ground only.

FORMULATIONS

- Technical

AROSURF MSF is applied directly to mosquito habitats at low volumes from shipping containers, by using ground and aerial techniques. When the product is used in this manner, no mixing with water, solvents, or spreading agents is required.

- Water-Base

While AROSURF MSF is virtually insoluble in water, a milky water suspension up to 10 percent by volume in water may be prepared through high sheer agitation, which can be applied with standard equipment calibrated to deliver 2-5 gal./acre. This suspension can be sprayed at high volumes to achieve maximum penetration of mosquito habitats where application of the technical material is impeded by vegetation.

AROSURF MSF should be added slowly to a spray tank containing water under vigorous agitation to assure that the product is uniformly suspended in the water. AROSURF MSF is lighter than water and will begin to rise to the surface of the water when agitation is stopped. Should this occur, the material should be thoroughly re-agitated before spraying to assure suspension of the product.

The mix can remain in a non-agitated spray tank at outdoor temperatures for long periods without product degradation. To insure a uniform suspension, before spraying, thorough agitation will be required. Be sure to return the material in the hose back into the agitated tank.

GENERAL SPRAY TANK AND MIXING PRECAUTIONS

- Clean ground and aerial spray systems thoroughly to remove residues of other mosquito larvicides (such as organophosphates and petroleum oils). Careful cleaning prevents contamination of AROSURF MSF, adverse product interactions, and possible detrimental non-target or environmental effects. For example, mixing diesel No. 2, AROSURF MSF and water can produce a "mayonaise-like" material that is unsprayable.
- Carefully flush the spray system with water if commercial detergents have been used for cleaning purposes. Detergent residues can act to destroy the film-forming properties of AROSURF MSF, and, therefore, its larvicidal effectiveness.
- Be sure non-agitating spray systems used for application of technical AROSURF MSF are free of water to prevent the formation of water-AROSURF MSF globules that can inhibit spraying.
- Clean AROSURF MSF spills or residues from the outside of vehicles to prevent oily deposits. Standard soaps or detergents are excellent for removing AROSURF MSF from outside surfaces, hands, and clothing.
- Do not blend more than 10% by volume of AROSURF MSF in water even when used in a spray system with high speed agitation.

RECOMMENDED APPLICATION RATES

AROSURF MSF can be applied as technical material or as a vigorously agitated water-base suspension, by ground and aerial techniques, to control first, second, third, and/or fourth instar larvae of most species of mosquitoes. Control is usually achieved within 24-72 hours after treatment at recommended application rates of 0.3-0.5 gal per surface acre of habitat water. Application rates of 0.2-0.3 gal per surface acre can be used to control pupae and/or emerging adults within 24 hours after treatment. It should be noted that the ideal application rates are dependent on the surface characteristics of the mosquito habitat, wind speed and direction, rainfall, habitat oxygen levels, habitat water temperature, mosquito species, larval instar, and stage of development.

Because AROSURF MSF is a surface-active material that is virtually insoluble in water, the volume (depth) of water in the mosquito habitat is not important when calculating application rates.

- Application Considerations

AROSURF MSF application to habitats subjected to persistent unidirectional winds of 10 mph or greater, surface drainage, overflow, or runoff will usually result in poor mosquito control due to displacement or removal of all or most of the AROSURF^R MSF from the habitat.

AROSURF MSF application to habitats containing mosquitoes that require little or no surface contacts for breathing, such as Coquillettidia spp., Mansonia spp., Culex erraticus, and Culex pilosis, will usually result in poor control at recommended dosages if applications are not timed to coincide with the pupal to emerging adult stages. Repetitive applications will usually be necessary if initial application is not timed with sensitive (surface contacting) stages. The high end of the dosage range is recommended in these situations.

AROSURF MSF application at the high end of the dosage range is recommended when spraying habitats whose surface is highly obstructed. The high dosage is expected to compensate for loss of AROSURF MSF on vegetation or floating debris, thereby assuring adequate persistence and effective spreading/re-spreading.

AROSURF MSF application at the high end of the dosage range is recommended when spraying habitats where multi-directional winds of 10 mph or greater are expected to persist for 24 hours after treatment.

It is recommended that when habitat surface expansion from rain or tides is expected to occur within 24 hours after treatment, the habitat be treated with an AROSURF MSF dosage that is based on the expected water surface area. This will help assure adequate persistence and can eliminate the need for re-treatment of mosquito broods resulting from the new water.

AROSURF MSF can be useful in controlling Culex spp. in certain dynamic permanent water habitats, such as sewage treatment systems. Higher than recommended rates of application (e.g. 0.75-1.00 gallon per surface acre) provide significantly prolonged film life and can greatly extend the interval between applications.

AROSURF MSF has been shown to spread on cold water at temperatures as low as 1°C to form a monomolecular film. Although AROSURF MSF may become visible (opaque) when applied to cold water, the applicator should be assured that the product is spreading, although at a slightly slower rate. The spreadibility of the product can be observed by adding a small amount (several milligrams) of baby powder to the surface of a cold water habitat, followed by several drops of AROSURF MSF which will visibly move the baby powder across the water surface.

METHODS OF APPLICATION

- Manual Applications

Because technical AROSURF MSF is applied at low treatment rates of 0.2-0.5 gals per surface acre of water, large areas can be controlled by individual applicators with small, easy-to-carry, inexpensive hand-activated pump sprayers or compressed air sprayers. For example, a 1 gallon sprayer contains sufficient AROSURF MSF to treat three surface acres at a dosage rate of 0.3 gal/acre. Application with individual sprayers has been shown to be useful in areas where vehicle-mounted systems and aerial spray techniques are not suitable.

- Automatic Applications

In controlled or impounded areas, similar to rice fields and sewage treatment ponds, AROSURF MSF can be applied by the use of gravity feed drip devices, such as commercial oilers, to provide prolonged mosquito controlling film pressure.

- Vehicle-Mounted Spray Application

Application of the low recommended dosages of AROSURF MSF is difficult to obtain in conventional vehicle-mounted, high-pressure/high volume spray systems used for roadside ditch larviciding operations. However, it is possible to obtain the correct dosage by forming a suspension of AROSURF MSF in water and equipping the vehicle spray system tank with vigorous paddle agitation. 3-5 gallons per acre (0.2 to 0.5 gallons technical AROSURF MSF) of this milky suspension can be applied while maintaining a reasonable vehicle speed and without overdosing. Other spray systems using injection valves or mixing nozzles can also be adapted to produce the water/AROSURF MSF suspensions.

Note: DO NOT add AROSURF MSF to water in a vehicle-mounted spray system that is not equipped with vigorous high-shear agitation. Inaccurate application rates and poor mosquito control can result from casual or improper mixing.

- Aerial Application

Technical AROSURF MSF can be applied at the recommended dosages by helicopters equipped with standard spray systems, provided these systems are modified by decreasing the normal pump pressure, the number of spray nozzles, or the size of the nozzle orifices. With these modifications, aerial application of technical AROSURF MSF is highly effective in controlling immature mosquitoes in uncanopied habitats having little or no emergent or surface vegetation. This technique permits a helicopter to cover large areas without the need for frequent reloading of the spray tanks. For example, a helicopter equipped with a spray tank containing 100 gallons of AROSURF MSF and calibrated for application at 0.4 gal/acre, can spray 250 surface acres of mosquito habitat without reloading.

Aerial spraying of technical AROSURF MSF is not recommended for habitats where the water's surface is moderately to highly obstructed. (e.g. salt marshes). The cover would prevent the product from reaching the water's surface in sufficient concentrations to be effective. Aerial application of high volumes of AROSURF MSF/water suspensions can be effective in penetrating moderately vegetated canopies. Applying the mix at rates of 3-5 gal./acre (i.e., 0.2-0.5 gal AROSURF MSF/acre) with helicopter systems using raindrop nozzles has been shown to be effective.

Note: Vigorous pre-mixing (e.g., in paddle agitated truck systems) is necessary to suspend the AROSURF MSF in water prior to filling the helicopter spray tanks). The standard recirculating system does not have sufficient agitation to make a uniform suspension.

FIELD PERSISTENCE

AROSURF MSF has a short term residual activity in a mosquito habitat at normal application rates, ultimately biodegrading to carbon dioxide and water by the action of naturally occurring habitat microorganisms. AROSURF MSF exhibits little or no reaction with saline or polluted water to form soluble organic salts. Mosquito control is therefore possible in a wide range of fresh, salt and polluted water habitats.

To be effective in killing immature mosquitoes, AROSURF MSF must be present on the water surface as a monomolecular film for a prolonged period of time. AROSURF MSF will persist for 2 to 10 days after treatment at application rates of 0.2 to 0.5 gallons/surface acres of water. The higher recommended dosages will usually result in longer film stability. Habitat surface characteristics, climatological conditions, microbial concentration of the habitat, and water temperature will effect the duration of the product on the water's surface.

MONITORING IN THE HABITAT

AROSURF MSF is not visible on the surface of the water - its presence does not produce a water sheen. However, the products' surface coverage can be determined by adding a drop of ADOL Indicator Oil to the water surface at several locations in the mosquito habitat. The use of the indicator oil at various intervals after AROSURF MSF application is an important operational tool to determine if additional treatment is necessary. Its use will assure the applicator that delayed kill will occur when rapid kill of mosquitoes is not obtained, preventing unnecessary reapplication. The product's presence can be determined as outlined below:

- When the drop of indicator oil does not spread (i.e., forms a compact bead on the surface of the water), the AROSURF MSF film is intact (stable). This small, highly compressed bead of indicator oil on the water's surface indicates that maximum mosquito-controlling film pressure is being exerted on the habitat.
- As the film is degraded by microbial, climatological, or various surface factors, the size (diameter) of the bead of the indicator oil steadily increases. An indicator bead the size of a dime indicates that the AROSURF MSF has almost degraded and is only marginally effective. Reapplication is recommended when this is observed.
- A spreading of the indicator oil, characterized by a silvery or slightly colored spreading pattern over the water's surface, indicates AROSURF MSF is either depleted (degraded), absent from the zone tested (eg., due to wind-induced displacement), or is not sufficiently present to be effective for mosquito control.

Note: Application of indicator oil in certain sewage treatment systems, characterized by heavy surface scum and debris, can produce false positive readings. In these cases, it is recommended that a few drops of indicator oil be added to the surface of the habitat prior to an application of Arosurf MSF to assure that the indicator oil will spread.

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MATERIAL HANDLING

- Storage Stability

AROSURF MSF naturally resists oxidative rancidity (decomposition), is non-volatile, and non-corrosive and has an essentially unlimited shelf-life when stored in indoor or outdoor facilities at ambient temperatures.

- Storage Precautions:

- Do not allow water to stand on drum tops for prolonged periods of time. Water may seep into the drums (through weeping) and cause rust formation which may clog spray nozzles.
- Arosurf MSF stored at or around freezing temperatures will not be damaged, but may become viscous and difficult to handle; due to higher molecular weight components settling in the drum. If this should occur, warm-up and remix the drum contents.
- Seal partially used drums tightly to prevent contamination.
- Use clean equipment when pumping, storing and generally handling AROSURF MSF. The product tends to "clean" equipment by removing rust and pesticide residues.
- Store ADOL Indicator Oil indoors to avoid temperatures below 10°C. Storage at near freezing will cause the product to become pastelike and difficult to apply.

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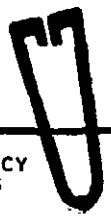
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U.S. ENVIRONMENTAL PROTECTION AGENCY OFFICE OF PESTICIDES PROGRAMS REGISTRATION DIVISION (WH-567) WASHINGTON, D.C. 20460	EPA REGISTRATION NO.	DATE OF ISSUANCE
	TERM OF ISSUANCE	
NOTICE OF PESTICIDE: <input checked="" type="checkbox"/> REGISTRATION <input type="checkbox"/> Reregistration <i>(Under the Federal Insecticide, Fungicide, and Rodenticide Act, as amended)</i>	NAME OF PESTICIDE PRODUCT	
	NAME AND ADDRESS OF REGISTRANT (Include ZIP code)	
<p>NOTE: Changes in labeling formula 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 U.S. EPA registration number.</p> <p>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.</p> <p>A copy of the labeling accepted in connection with this Registration/Reregistration is returned herewith.</p> <p>Registration is in no way to be construed as an indorsement or approval of this product by this Agency. In order to protect health and the environment, the Administrator, on 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.</p>		
<input checked="" type="checkbox"/> ATTACHMENT IS APPLICABLE		
SIGNATURE OF APPROVING OFFICIAL		DATE



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2. If necessary, you will submit and/or cite all data required for registration/re-registration of your product under FIFRA Sect. 3(c)(5) when the Agency requires all registrants of similar products to submit such data.
3. You will submit production information (pounds or gallons produced) for this product for the fiscal year(s) in which the product is conditionally registered, in accordance with FIFRA Sect. 29. The fiscal year begins October 1 and ends September 30. The production information will be submitted to the Agency no later than November 15, following the end of the preceding fiscal year.

This information should be submitted to:

Registration Support and Emergency Response Branch
Registration Division (TS-767)
Environmental Protection Agency
Washington, D.C. 20460

4. You will submit five (5) copies of your final printed labeling before you release the product for shipment. Refer to the A-79 Enclosure for a further description of final printed labeling.

If these conditions are not complied with after the registration is issued, the registration will be subject to cancellation in accordance with Section 6(e) of the Act.



William H. Miller
Product Manager (16)
Insecticide-Rodenticide Branch
Registration Division (TS-767)

BEST DOCUMENT AVAILABLE