June 10, 2009

Weymouth Conservation Commission
c/o Mary Ellen Schloss, Administrator
Town Hall
75 Middle Street
E. Weymouth, MA 02189

Re: Request for Amendment to the Order of Conditions for Whitman's Pond (DEP file # 81-1041)

Dear Commissioners,

Please accept the following as a formal request for the amendment of the existing Order of Conditions regarding Whitman's Pond (DEP # 81-1041) to include the use of the USEPA/MA DAR registered aquatic herbicides Sonar (fluridone), AquaPro (glyphosate) and Renovate (triclopyr) herbicide. The following request is being made on behalf of the Town of Weymouth and the Community Preservation Committee in a continued effort to manage nuisance, non-native aquatic vegetation species, namely Fanwort (*Cabomba caroliniana*) and Variable watermilfoil (*Myriophyllum heterophyllum*) in Whitman's Pond. Treatment in 2009 will specifically target growth of these two non-native species in the 17 acre area of Whitman's Pond know as West Cove. Approval for the use of three Sonar formulations is being requested: Sonar AS (liquid), Sonar Q (granular) and Sonar PR (granular). Approval for the use of AquaPro and/or Renovate is also being requested for to control the expanding population of purple loosestrife (*Lythrum salicaria*) around the shoreline of the pond.

Typically nuisance aquatic vegetation and algae management projects are filed under the Limited Project status [310 CMR 10.53(4)] since the primary objective of this project is to manage nuisance and non-native aquatic vegetation, while preserving a beneficial cover of native plants species for fish/wildlife habitat. Reducing over-abundant aquatic vegetation will actually improve fish habitat, improve water quality and increase access for recreational pursuits. No significant alteration to wetland resources areas will occur as a result of the proposed management program; instead the resource areas will be enhanced by controlling the over abundant non-native growth. The proposed management activities are consistent with the guidelines in the following documents:

- Final Generic Environmental Impact Report: Eutrophication and Aquatic Plant Management in Massachusetts (June 2004)

- Guidance for Aquatic Plant Management in Lakes and Ponds: As it Relates to the Wetlands Protection Act (April 2004 – DEP Policy/SOP/Guideline # BRP/DWM/WW/G04-1).

Excessive vegetation and algae growth can have many adverse impacts on an aquatic ecosystem, such as the depletion of dissolved oxygen levels, loss of predator/prey interaction as a result of decreased open-water habitat, and an acceleration of the filling in of the waterbody (eutrophication). Due to the relatively shallow nature of Whitman's Pond and the fertile bottom substrate, the pond has the ability to support dense aquatic vegetation and algae for indefinite periods of time. The presence of non-native, invasive fanwort and variable watermilfoil, exacerbates this problem warranting management.

The Town of Weymouth and the Community Preservation Committee are aware that native aquatic vegetation is important to the waterbodies ecosystem. The goal of management at Whitman's Pond is to manage exotic species wherever they occur while promoting the growth and proliferation of more beneficial native aquatic plant species.

To alleviate the conditions of nuisance vegetation in Whitman's Pond, treatment with Sonar (fluridone) herbicide is proposed. Sonar specifically affects the target plant species to be controlled and does not pose an unreasonable adverse risk to non-target species and wildlife when applied by professionals in accordance with the label directions. Sonar has no adverse impacts on fish during any stage of their development and has been used in a number of herring hatcheries in the northeast, most notably Long Pond in Barnstable, which has been treated annually with Sonar since 2002 with no observed impacts on the herring fishery. Aquatic Control has also applied Sonar at a variety of sites throughout the northeast that are home to expansive alewife fisheries. No application of Sonar is know to have ever had adverse impacts on populations of alewife.

The initial management of submersed growth will be focused on control of the exotic fanwort and variable watermilfoil in West Cove, however, approval to use Sonar in the "main body" of Whitman's Pond is also requested should treatment be warranted elsewhere in future years. Control of fanwort and variable watermilfoil will be achieved with a partial-lake treatment using a combination of Sonar formulations. Using both liquid and pellet formulations of Sonar can help maintain in-water fluridone concentrations throughout the treatment, ultimately reducing the amount of herbicide used, while providing consistent in-water concentrations over the course of the treatment. Due to the extended contact time required to control the target plants (~45-60 days), multiple "split" applications of the herbicide may be conducted. The dose and frequency of these follow-up treatments is guided by herbicide residual testing (FasTEST). We anticipate that one and perhaps two "low-dose" applications of Sonar will be required over the course of the summer. These treatments usually provide 2-3 years of good plant control, and should significantly reduce the presence of both nuisance species.

We will look to target a dose in the range of ~ 20 -30 ppb for the initial treatment and to maintain a dose of ~ 10 ppb or greater for a period of ~ 60 days or longer. This chemical dose (~20-30 ppb) is far below the maximum EPA permissible dose for Sonar of 150 ppb. The initial treatment and one or possibly two "booster" applications should be adequate to provide thorough control of the target species. It is important that the treatment program commence preferably in mid/late June at the latest, although our 2003 treatment of West Cove was performed in July and was still successful. Earlier treatment equates to less plant biomass that will decompose (and resulting potential for loss of oxygen) and the uptake of fluridone by the target plants is more rapid when those plants are actively growing in June.

Fluridone has a different mode of action than other aquatic herbicides. It inhibits carotenoid synthesis, which allows the chlorophyll to be degraded by sunlight and causes the plant to "starve to death." The plants die-off slowly (over 60-90 days), which greatly decreases the chances for dissolved oxygen depletion. – a most important consideration in West Cove, considering its high plant density and shallow water depth.

We recommend and propose using Sonar AS liquid herbicide for the treatment program in West Cove, considering the predominant "highly soft "muck" sediments" found on the cove bottom and the potential for Sonar pellets to "plug". The inclusion of Sonar pellet formulations (Q & PR) is requested, however, should other areas of the main basin be targeted in future years, as pellet formulations do allow for area specific spot treatments where the use of Sonar AS liquid would not be effective, owing to dilution and dissipation of the herbicide away from the targeted area.

All chemical applications will be performed by trained MA Certified personnel. The liquid Sonar herbicide is first diluted with pond water in mixing tanks on-board the spray boat. This diluted herbicide solution is then injected subsurface from weighted hoses that trail the boat to avoid any aerial drift of the herbicide. The herbicide is evenly applied throughout the treatment sectors using a calibrated on-board pump and chemical metering system. The USEPA/MA registered aquatic herbicides will be applied at or below the allowable label rate, in accordance with the "Order of Conditions" and DEP "License to Apply Chemicals" permits. The shoreline will be posted with signs, warning of all temporary water use restrictions prior to treatments. A site specific "License to Apply Chemicals" for the proposed treatment will be filed with Massachusetts DEP, Office of Watershed Management. A copy of this License will be provided to the Commission prior to treatment.

Areas of purple loosestrife along the shoreline of Whitman's Pond are also to be targeted for the control of non-native, invasive purple loosestrife. Control of purple loosestrife will be gained with the use of AquaPro (glyphosate) and/or Renovate (triclopyr) herbicide. The concentrated herbicide will be diluted with pond water and will be topically sprayed on the target loosestrife plants. Only one application of AquaPro/Renovate is anticipated sometime between late July and Early August. Either AquaPro or Renovate 3 will be topically applied with a low-pressure pump sprayer or backpack sprayer and could be on purple loosestrife in a site specific manner.

Vegetation Monitoring

Pre and post-treatment monitoring are an integral aspect of any vegetation control effort, and will be preformed annually at Whitman's Pond to document changes in vegetation composition and distribution throughout the course of the management program. Recommendations for future management objectives will be based in large part on the results of the monitoring program. In anticipation of this submission a Pre-Treatment survey of West Cove and North West Cove were performed on 6/8/09. A map of the vegetation observed at the time of the survey is attached.

Chemical Descriptions

The following is a brief description of the products proposed for use at the Ponds at Whitman Pond. Additional information is attached.

Sonar™

Fluridone when applied at recommended dosages is generally viewed as having one of the most "environmentally friendly" toxicology profiles of all products currently on the market. In fact, the USEPA has approved a limit of 150 ppb to be allowed in water used for drinking, which is also the maximum application rate for waterbodies 10 acres and larger. For waterbodies less than 10 acres, the maximum application rate is 90 ppb. The target rate for Whitman's Pond to control the nuisance species found in Whitman's Pond would be ~10-20 ppb which is significantly below the maximum labeled rate. Fluridone has no temporary water use restrictions other than 1.) No application within one-quarter mile of a potable water intake and 2.) No use of treated water for irrigation purposes within 30 days of treatment.

When using fluridone, it is not so much the dose that matters as the amount of time the vegetation is in contact with the herbicide. A "chemical to plant contact time" of 45-60 days will be required for effective control. One or two "booster" treatments will probably be necessary to keep the concentration within the correct target range.

AquaPro®

The USEPA/MA registered herbicide, AquaPro® (glyphosate) is used to control lilies and other floating-leafed or emergent plants like common reed. Rodeo is also effective on purple loosestrife weed. Application for purple loosestrife occurs when the plant is in flower. For purple loosestrife, AquPro is typically applied in late July to early August after the flowers have been produced. The area and species selective control of AquaPro allows treatments to "thin" present populations and prevent future expansion. AquaPro would be applied at the recommended Federal/State concentration of 3 quarts/acre. There are no water use restrictions associated with the use of AquaPro other than in the vicinity of potable water intakes, but prudent practice calls for restriction of water usage on the day of treatment as an additional safeguard. These restrictions are consistent with good pesticide practice and Massachusetts guidelines for aquatic treatments.

AquaPro is a systemic herbicide and is foliar active, which means its chemical ingredient is active only on contact with the plant. It has no activity in surrounding soil or water. The chemical is applied to the target plants and is trans-located down into the roots of the plant. Glyphosate is absorbed by plant foliage and moves throughout plant tissues. Once inside the plant, the active ingredient in glyphosate interrupts the plant's ability to produce a protein it needs to live. The protein that glyphosate targets is found only in plants and does not exist in humans, wildlife or fish. Glyphosate binds tightly to most types of soil particles and is unavailable for root uptake. There is low potential for leaching or contamination of groundwater with Rodeo herbicide. Micro-organisms in the soil and water break down into its natural components.

Renovate®

The USEP Renovate (triclopyr) herbicide will be applied at a rate of 2-4 qts./ac.. The herbicide concentrate will be diluted with fresh water and mixed with an approved nonionic, aquatic surfactant at a rate of 0.5% of the spray solution. Renovate is manufactured or control of submersed, emergent and/or floating-leafed vegetation located in open-water or wetland areas. Careful plant specific application techniques allow for species and area selective control of nuisance plants. Renovate applications will be scheduled for a day with suitable weather forecast (i.e. no rain or excessive wind). AquaPro treatments will be targeted once the plants have fully matured and reached full inflorescence (flower), usually between late August and mid-October. Renovate treatments, however, will be performed when the plants are actively growing but not fully mature (recommended plant height of 0.5-3.0 ft. – late May-June). Although unlikely, more than one treatment may be performed in a single growing season. There are no water use restrictions associated with the use of Renovate other than the irrigation restriction which can last up to 120 days. Post-treatment concentrations can be monitored by immunoassay to determine when the irrigation restriction can be lifted. As with other applications prudent practice calls for restriction of water usage on the day of treatment as an additional safeguard. These restrictions are consistent with good pesticide practice and Massachusetts guidelines for aquatic treatments

ALTERNATIVES TO THE PROPOSED MANAGEMENT PROGRAM

Mechanical Harvesting: Not Recommended in Proposed Management Area.

Harvesting of plant material is beneficial is some situations. However, given the shallow nature of the proposed management area and the plant assemblage present, harvesting would not be an appropriate technique. Plants like fanwort and variable watermilfoil may actually increase in density and spread post-cutting due to their success at reproduction through vegetative fragmentation.

Physical: Not Recommended

Physical controls, such as the use of bottom weed barriers (i.e. Palco and Aquascreen) are effective for small dense patches of nuisance vegetation in much larger waterbodies, most commonly, in swim areas,

around docks and piers. Costs for material/ installation are in the range of $1.00-1.50/sq.-ft. Barriers used over large contiguous tracts may also prevent use of the bottom sediments by fish, amphibians, insects and other aquatic organisms.

Biological: Not Recommended.

There are no effective biological controls available or approved by the State for the control of the target aquatic plants in these ponds.

Winter Drawdown: Not Recommended

Winter drawdown is not a preferred management strategy at Whitman Pond because the shallow bottom contour of the waterbodies precludes the ability to expose all nuisance plant growth. Furthermore, lowering the lake level to such an extent may have unacceptable impacts on fish and wildlife and may not be easily permitted by local/state regulatory agencies.

Sediment Excavation: Not Feasible at this Time

Dredging of the nutrient-rich bottom sediment is sometimes used as a strategy to control excessive weed and algae growth. Conventional (dry) or hydraulic dredging would likely require the expenditure of $50,000 or more in design and permitting fees alone. Dredging would also be very expensive and disruptive undertaking at any of the Ponds at Whitman's Pond. Dredging may also have severe impacts to aquatic organisms (i.e. fish, macro invertebrates) in the pond and there is no guarantee that dredging alone will control nuisance weed and algae growth.

Do Nothing: Not recommended.

If the nuisance aquatic vegetation is allowed to continue to grow unabated, the pond will become further infested with these species. The increased vegetation, algae and organic sediment will degrade fishery and wildlife habitat, accelerate the eutrophication (filling in) of the waterbodies and severely impact the aesthetic, recreational and functional value that the ponds provide. It is not the goal of this project to rid the ponds of all vegetation or organic sediment, but to manage the plants and pond-bottom in order to preserve open water habitat while maintaining the aesthetics of the on-course water hazards and the functionality of the irrigation ponds.

MASSACHUSETTS WETLANDS ACT

The following is a discussion of the proposed aquatic management program concerning the specific interests of the Massachusetts Wetlands Act.

Public and Private Water Supply

Dwellings located around Whitman Pond neighborhood are serviced by Public water and the ponds water is not used directly for any purpose.

Protection of Groundwater Supply

The groundwater supply will not be significantly impacted by the proposed application of the chemicals to the pond. Contamination of groundwater by aquatic herbicides/algaecides is limited by the low rate of application and their rapid rate of degradation and uptake by target plants and adsorption to soils. All of the chemicals that may be used in these ponds are approved by MA DEP's Office of Research and Standards for use in Zone II areas. Aquatic Control's State licensed applicators take all necessary precautions when mixing and disposing of all chemical containers to ensure that no ground water supplies are affected.

Flood Control and Storm Damage Prevention

No construction, dredging or alterations of the existing floodplain and storm damage prevention characteristics of the pond are proposed. However, in some instances, abundant and excessive aquatic plant growth can contribute to high water and flooding. Most commonly this occurs in the vicinity of waterbody outlets or water conveyance channels and structures. The unmanaged annual growth and decomposition of aquatic vegetation is also known to increase sediment deposition at an accelerated rate. Therefore, the management of nuisance vegetation may increase the ability of the resource area over the long-term to provide flood protection.

Prevention of Pollution

No degradation of water quality or increased pollution is expected by the application of the herbicides/algaecide. Removal of the excessive growth of aquatic vegetation will contribute to improved water circulation and a reduction in the potential for anoxic conditions. The post treatment decrease in plant biomass will help to decrease the rate of eutrophication currently caused by the decomposing of excessive plant material.

Protection of Fisheries and Shellfisheries

The dense aquatic vegetation provides poor habitat to fish and other aquatic organisms. In addition, oxygen levels can “plummet” under conditions of dense plant and algae growth, which can stress or be lethal to fish or other aquatic organisms.

Protection of Wildlife and Wildlife Habitat

In general, excessive and abundant vegetation provides poor wildlife habitat. The proposed management plan is expected to help prevent further degradation of the pond through excessive weed growth and improve the wildlife habitat value of the pond in the long-term, by preserving natural shoreline emergent vegetation, maintaining plant diversity, and improving the "open-water" conditions in the pond.

Whitmans Pond

Weymouth, MA

Site Locus

FIGURE:	SURVEY DATE:	MAP DATE:
1	6/8/09	6/10/09

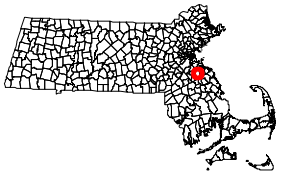
Legend:

N

0 305 610 1,220 1,830 2,440 Feet

AQUATIC CONTROL TECHNOLOGY, INC.

11 JOHN ROAD
SUTTON, MASSACHUSETTS 01590
PHONE: (508) 865-1000
FAX: (508) 865-1220
WEB: WWW.AQUATICCONTROLTECH.COM



Whitmans Pond

Weymouth, MA

2009 Proposed Treatment Map

FIGURE:	SURVEY DATE:	MAP DATE:
2	6/8/09	6/10/09

Legend:

Proposed extent of 2009 Sonar treatment (~17 acres)

N

0 312.5 625 1,250 1,875 2,500 Feet

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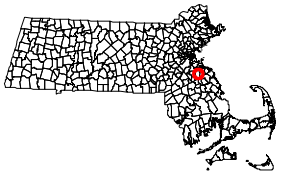

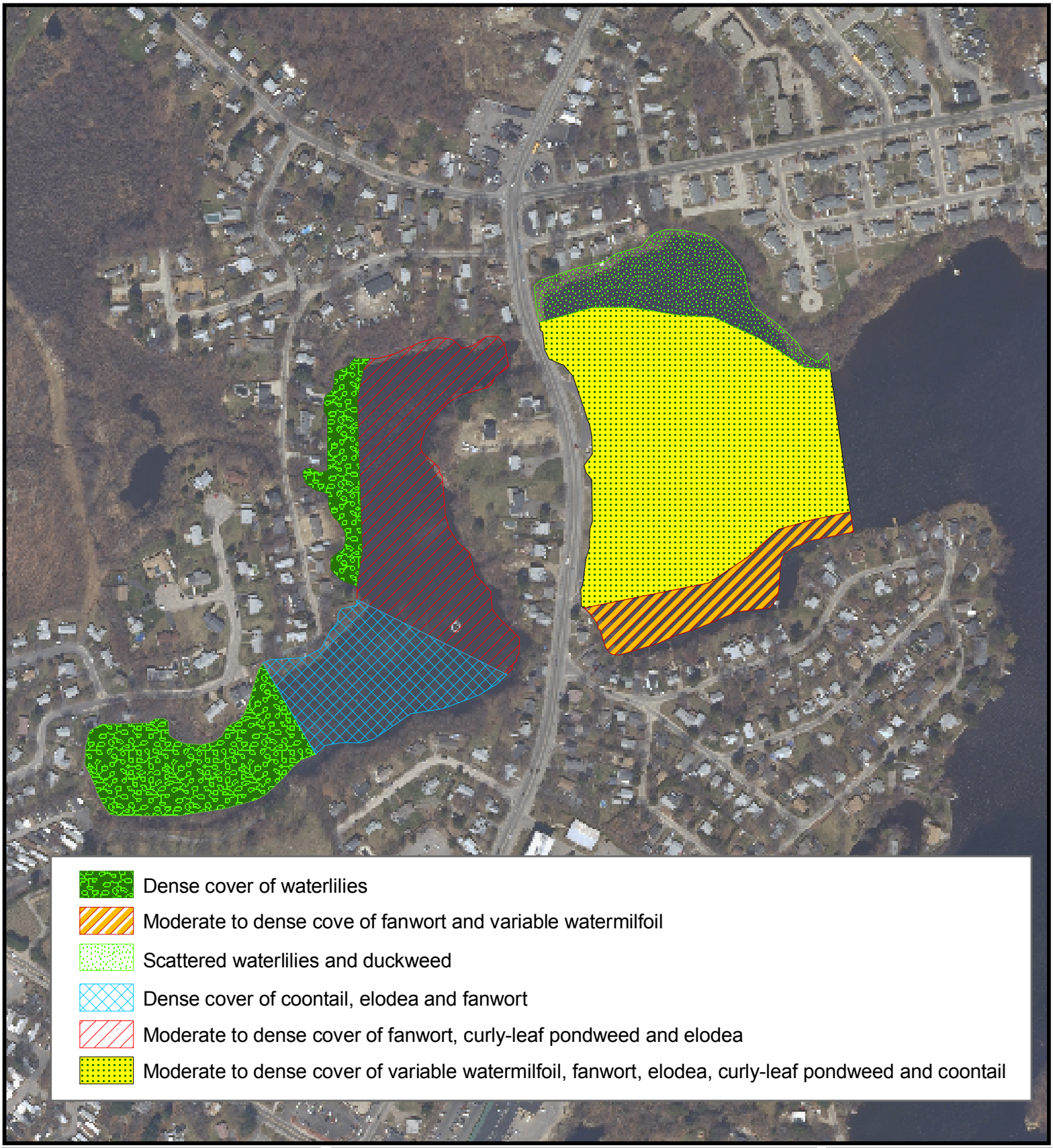

Whitmans Pond

Weymouth, MA

2009 Vegetation Assemblage

FIGURE:	SURVEY DATE:	MAP DATE:
3	6/8/09	6/10/09

Legend:

N

0 125 250 500 750 1,000 Feet

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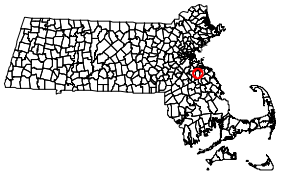

Fluridone (Sonar®)

March 2000

Fact Sheet

Environmental Health Programs
Office of Environmental Health & Safety

Washington State Department of Health

Fluridone is an aquatic herbicide used to control common nuisance plants like pondweed and watermilfoil. It is not equally effective at killing all water plants and has been used in Washington to selectively remove certain nuisance weeds. It is absorbed by the leaves, shoots and roots of vascular plants and kills susceptible plants by inhibiting their ability to form carotene, a substance which plants need to maintain essential levels of chlorophyll. Damage in susceptible plants usually appears in 7-10 days after water treatment.

Fluridone is the active ingredient in Sonar® and comes in two formulations: pellets (Sonar SRP) and liquid concentrate (Sonar A.S.)

The initial rate of application recommended by Sonar labels is quite dilute and varies depending on the size of pond or lake, density of weeds, and susceptibility of targeted weeds. Control of watermilfoil in Washington is often accomplished with rates as low as 10-20 parts per billion (ppb).

Environmental Persistence

Fluridone is moderately persistent in water and sediments following treatment of a pond or lake. Field tests have shown that the average half-life in pond water is 21 days and longer in sediments (90 days in hydrosoil). Residues may persist longer depending on the amount of sunlight and the water temperature. Fluridone is primarily degraded by sunlight and microorganisms.

Health Impacts

Laboratory animals (mice, rats, dogs) fed fluridone in their diets showed little signs of toxicity even when fed levels which far exceed potential human exposure from use of Sonar. Fluridone is not considered to be a carcinogen or mutagen and is not associated with reproductive or developmental effects in test animals.

There is no EPA standard for maximum allowable concentration (MCL) of fluridone in public water supplies. For the purpose of Sonar product registration, EPA determined that 150 ppb is an acceptable level for potable water following Sonar use. This level provides a 1000-fold safety factor between the no effect level in experimental animals and the estimated human exposure via drinking water.

Common Questions

Can I use treated lake water for drinking? The Sonar label prohibits application to water within 1/4 mile of functioning potable water intakes unless the treatment rate is 20 ppb or less. Estimated human exposure from daily consumption of water with 20 ppb of fluridone is 10,000-fold less than the no effect level in test animals. People who wish to avoid even minimal residues can do so by filtering their drinking water with a charcoal-based filter.

Can I swim and fish in treated water? There are no swimming or fishing restrictions associated with fluridone treatment. Fluridone does not significantly bioaccumulate or biomagnify in fish. Consumption of fish from treated water does not pose a threat to human health.

Can fluridone leach into groundwater wells, which are shallow and close to a treated water body? Fluridone tends to bind to organic matter and should not leach into groundwater from aquatic sediments. Fluridone shows a limited ability to leach if applied to soil.

What about the other ingredients in Sonar? "Inert" ingredients included in formulations of fluridone are confidential. DOH was permitted to review the list of inerts in Sonar and concluded that these chemicals are not of human concern at applied concentrations.

Can I use treated water for watering domestic plants? For information about susceptibility of specific plants, consult the product label or contact the manufacturer. According to the manufacturer, Sonar used at the maximum-labeled rate (150 ppb) may affect domestic plants, especially plants in the *Solanaceae* family (tomato, potato, eggplant, peppers etc.). More dilute concentrations are unlikely to affect domestic plants. Again, a charcoal-based filter will remove fluridone residues from water.

Need More Information?

Please Contact:

- Your county health agency
- Washington State Department of Health Pesticide Program (360)236-3360
- Washington State Department of Ecology Water Quality Program (360)407-6563
- Sepro is the company which manufactures Sonar products. Material Safety Data Sheets and current copies of Sonar labels are available by calling 1-800-419-7779 or at the Sepro website www.sepro.com/aquatics/sonar/index.html
- Additional copies of this fact sheet can be obtained from:
  Office of Environmental Health & Safety
  P.O. Box 47825
  Olympia, Washington 98504-7825
  Tollfree: (888) 586-9427

Sonar*

Humans who are exposed to Sonar-treated water are at negligible risk

Drinking Sonar-Treated Water

A 70-kg adult (about 154 pounds) would have to drink over 1,000 gallons (child - 285 gallons) of water daily, containing the maximum legally allowable concentration of Sonar in potable water (0.15 ppm), for a significant portion of their lifetime to receive a dose equivalent to the NOEL.

Swimming in Sonar-Treated Water

At the maximum allowable concentration of Sonar in water (0.15 ppm), an adult would have to swim for 24 hours every day for over 57 years to receive an amount equal to the NOEL.

Eating Fish from Sonar-Treated Water

Adults would have to consume 2,467 pounds (child - 705 pounds) of fish daily, at the maximum allowable tolerance limit in fish (0.5 ppm), for a significant portion of their lifetime to receive the dose equal to the NOEL.

Eating Food Crops Irrigated with Sonar-Treated Water

Adults would need to eat over 8,250 pounds (child - 2,300 pounds) of these foods daily, at the maximum allowable tolerance limit (0.1 - 0.15 ppm), for a significant portion of their lifetime to receive the dose equal to the NOEL.

Eating Livestock Exposed to Sonar from Drinking Treated Water

Adults would need to eat 25,000 pounds (child - 7,000 pounds) of these foods daily, at the maximum allowable tolerance limit in meat, poultry, eggs, and milk (0.05 ppm), for a significant portion of their lifetime to receive the dose equal to the NOEL.

WHAT IS NOEL?

No Observable Effect Level (NOEL) - the highest dose at which no adverse effects are observed in laboratory animals.

The maximum non-toxic dose is usually established by laboratory studies in animals and is reported as the NOEL.

The dietary NOEL for Sonar is approximately 8 milligrams per kilogram of body weight per day (8mg/kg/day). This NOEL was determined from a study in rats that were fed Sonar in their regular diets every day for their entire two-year lifetime.

WHAT IS NEGLIGIBLE RISK?

This term is used because it is beyond the capabilities of science to prove that a substance is absolutely safe, i.e., that the substance poses no risk whatsoever. Any substance, be it aspirin, table salt, caffeine, or household cleaning products, will cause adverse health effects at sufficiently high doses. Normal exposure to such substances in our daily lives, however, are well below those associated with adverse health effects. At some exposure, risks are so small that, for all practical purpose, no risk exists. We consider such risks to be negligible or insignificant.

11550 N. Meridian St. Suite 180
Carmel, IN 46032-4562
1.800.419.7779

Sonar*

An Effective Herbicide That Poses
Negligible Risk To Human Health
And The Environment

SONAR*
An Effective Herbicide That Poses Negligible Risk To Human Health And The Environment

Sonar is a highly effective aquatic herbicide used to selectively manage undesirable aquatic vegetation in freshwater ponds, lakes, reservoirs, rivers and canals. Sonar is absorbed through the leaves, shoots, and roots of susceptible plants, and destroys the plant by interfering with its ability to make and use food. As with any substance introduced into the environment, concerns arise about possible harmful effects on humans who may come into contact with it, and about its effects on wildlife and plants that we wish to protect and preserve. The following discussion, presented in a "Question and Answer" format, provides information regarding Sonar and evidence that Sonar presents negligible risk[1] to human health and the environment when applied according to its legally allowed uses and label directions.

Q1. What are the legally approved uses of Sonar?

A1. Sonar has been approved for use by the U.S. Environmental Protection Agency (USEPA) since 1986 for the management of aquatic vegetation in freshwater ponds, lakes, reservoirs, drainage canals, irrigation canals and rivers. There are no USEPA restrictions on the use of Sonar-treated water for swimming or fishing when used according to label directions. The Agency has approved Sonar's application in water used for drinking as long as residue levels do not exceed 0.15 parts per million (ppm) or 150 part per billion (ppb). For reference, one (1) ppm can be considered equivalent to roughly one second in 12 days or one foot in 200 miles, and (0.1) ppm can be considered approximately equal to one second in 120 days or one foot in 2,000 miles.

Sonar's USEPA-approved labeling states that in lakes and reservoirs that serve as drinking water sources, Sonar applications can be made up to within one-fourth mile (1,320 feet) of a potable water intake. For the control of Eurasian watermilfoil, curlyleaf pondweed and hydrilla where treatment concentrations are 0.01 to 0.02 ppm (10 to 20 ppb), this setback distance of one-fourth mile from a potable water intake is not required. Note that these effective treatment concentrations are well below the 0.15 ppm (150 ppb) allowable limit in water used for drinking.

Local public agencies may require permits for use of an herbicide in public waters. Therefore, the Sonar label states that the user must consult appropriate state or local water authorities before applying the herbicide.

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[1]Throughout this document, we use the phrases "negligible risk" or "no significant risk." We use these terms because it is beyond the capabilities of science to prove that a substance is absolutely safe, i.e., that the substance poses no risk whatsoever. Any substances, be it aspirin, table salt, caffeine, or household cleaning products, will cause adverse health effects at sufficiently high doses. Normal exposures to such substances in our daily lives, however, are well below those associated with adverse health effects. At some exposure, risks are so small that, for all practical purposes, no risk exists. We consider such risks to be negligible or insignificant.

*Trademark of SePRO Corporation

Q2. How does a product such as Sonar gain approval for use? (How does it become registered?)

A2. Federal law requires that an aquatic herbicide be registered with the USEPA before it can be shipped or sold in the United States. To obtain registration, manufacturers are required to conduct numerous studies (i.e., over 120 studies depending upon the intended uses) and to submit a thorough and extensive data set to USEPA to demonstrate that, under its conditions of use, the product will not pose a significant risk to human health and the environment and that the herbicide is effective against the target weeds or plants.

Individual states can establish registration standards that are more strict than federal standards, but not less strict.

Q3. What types of information must be submitted to regulatory agencies before an herbicide is registered?

A3. To register a herbicide, the manufacturer must submit information that falls into the following categories: product chemistry (for example, solubility, volatility, flammability and impurities), environmental fate (for example, how the substance degrades in the environment), mammalian toxicology (studies in laboratory animals used to assess potential health risks to humans), and wildlife and aquatic (for example, bird and fish) toxicology. If there are any residues in the environment, their levels must be determined. A manufacturer also conducts studies of product performance (or efficacy as a herbicide).

Q4. Have all of the data required for registration of Sonar been submitted to regulatory agencies, and have those agencies found the data acceptable?

A4. The data required for registration of Sonar by the USEPA is complete and has been accepted by the USEPA and by all states.

Q5. What happens to Sonar when it is used according to approved labeling -- that is, what is its environmental fate or what happens to Sonar once it is released or applied to the water?

A5. Tests under field conditions show that Sonar disappears from treated water in a matter of weeks or months, depending on a number of environmental factors such as sunlight, water temperature and depth. In lakes, reservoirs, rivers and canals where only a portion of the water body is treated, dilution reduces the level of Sonar relatively quickly following application.

Sonar does not persist in the environment. Its disappearance from aquatic environments is accomplished by several processes. First, the plants that are being treated absorb Sonar, thereby removing a portion of it from the water. Second, Sonar degrades or breaks down in the presence of sunlight by a process called “photo degradation.” Photo degradation is the primary process contributing to the loss of Sonar from water. Third, adsorption of Sonar to hydrosoil (sediments) also contributes to its loss from water. As Sonar is released from hydrosoil back into the water, it is photo degraded.

Study results indicate that Sonar has a low bioaccumulation potential and therefore is not a threat to the food chain. Specifically, studies have shown that Sonar does not accumulate in fish tissue to any significant degree. The relatively small amounts of Sonar that may be taken up by fish following application are eliminated as the Sonar levels in water decline. In a study of crops irrigated with Sonar treated water, no residues of Sonar were found in any human food crops, and only very low levels were detected in certain forage crops. Consumption by livestock of Sonar-treated water and crops irrigated with Sonar-treated water was shown to result in negligible levels of Sonar in lean meat and milk. Sonar-treated water can be used immediately for watering livestock.

To ensure that residue levels of Sonar pose no significant risk, USEPA has established tolerances, or maximum legally allowable levels, in water, fish, and crops irrigated with Sonar-treated water, and other agricultural products (including eggs, milk, meat, and chicken). For example, the 0.15 ppm (150 ppb) concentration in water mentioned in the answer to Question #1 is the tolerance limit for water that is used for drinking. The recommended application rates of Sonar (detailed on the label) are established to ensure the product will do its job and that tolerance limits won't be exceeded.

Q6. How might people come into contact with Sonar after it is applied to an aquatic site?

A6. People could come into contact with Sonar by swimming in water bodies treated with the herbicide, by drinking water from treated lakes or reservoirs, by consuming game fish taken from treated waters, and by consuming meat, poultry, eggs or milk from livestock that were provided water from treated surface water sources.

Q7. Is it likely that people will be harmed because of those contacts?

A7. Extensive studies have demonstrated that contact with Sonar poses negligible health risks when the herbicide is used according to label instructions. The label for Sonar carries no restrictions for swimming or fishing in treated water or against drinking water treated with Sonar. Sonar does not build up in the body.

The conclusion that Sonar poses negligible health risks is evidenced by USEPA's toxicity rating for Sonar. The USEPA classifies herbicides according to their acute toxicity or potential adverse health effects and requires that a "signal word" indicating the relative toxicity of the herbicide be prominently displayed on the product label. Every herbicide carries such a signal word. The most acutely toxic herbicide category requires the signal word DANGER. However, if the product is especially toxic, the additional word POISON is displayed. Herbicides of moderate acute toxicity require the signal word WARNING. The least toxic products require the signal word CAUTION. Sonar labels display the word CAUTION, the USEPA's lowest acute toxicity rating category.

Q8. How do we know that humans are not likely to experience any harmful effects from Sonar's temporary presence in the environment?

A8. Companies that develop new herbicides are required to: 1) conduct extensive investigations of the toxicology of their product in laboratory animals; 2) characterize the ways by which people may contact the herbicide after it has been applied to an aquatic site; 3) determine the amount of exposure resulting from these possible contacts; and 4)

demonstrate the fate of the herbicide in the environment. Before USEPA will register a herbicide, the Agency must establish with a high degree of certainty that an ample safety margin exists between the level to which people may be exposed and the level at which adverse effects have been observed in the toxicology studies.

Investigations of the toxicity of Sonar have been performed in laboratory animals under a variety of exposure conditions, including exposure to very high doses for short periods (acute studies), as well as repeated exposures to lower doses (which are still far in excess of any exposures that humans might actually receive) throughout the lifetime of the laboratory animals (chronic studies). Other special studies have been performed to evaluate the potential for Sonar to cause reproductive effects, cancer, and genetic damage. Study results indicate a low order of toxicity to mammalian species following acute exposures and repeat-dose exposures for up to a lifetime. In addition, repeated doses of Sonar did not result in the development of tumors, adverse effects on reproduction or on development of offspring, or genetic damage.

In characterizing the toxicity of a compound and its safety margin for exposures of humans and wildlife, toxicologists attempt to identify the maximum dose at which a chemical produces no toxicity. Another way of stating this is how much of the chemical can an organism be exposed to before it reaches a toxic level (recall from the footnote to the introduction on page 1 that all substances are toxic at some dose or level). This maximum non-toxic dose is usually established by studies in laboratory animals and is reported as the "no-observed-effect level" or NOEL. The dietary NOEL for Sonar (that is, the highest dose at which no adverse effects were observed in laboratory animals fed Sonar) is approximately 8 milligrams of Sonar per kilogram of body weight per day, abbreviated 8 mg/kg/day. This NOEL was derived from a study in rats that were fed Sonar in their regular diets every day for their entire two-year lifetime.

To put this NOEL into perspective, a 70-kg adult (about 150 pounds) would have to drink over 1,000 gallons of water containing the maximum legally allowable concentration of Sonar in potable water (0.15 ppm) daily for a significant portion of their lifetime to receive a dose equivalent to the 8 mg/kg/day NOEL. At most, adults drink about 2 quarts (one-half gallon) of water daily, which means that even if a person were drinking water with the maximum legally allowable concentration of Sonar, their margin of safety would still be at least 2,000. Similarly, a 20-kg child (about 40 pounds) would have to drink approximately 285 gallons of Sonar-treated water every day to receive a dose equivalent to the NOEL.
Because children drink only about one quart of water daily, this provides a safety margin of greater than 1,000.

The above example calculation of safety margins is based on the assumption that potable water will contain levels of Sonar at its maximum allowable concentration of 0.15 ppm (150 ppb). In fact, the Sonar concentration achieved under typical applications is closer to 0.02 ppm (20 ppb), thereby providing a safety margin seven times greater. The point is that adults and children who drink water from potable water sources that have been treated with Sonar according to label instructions are at negligible risk.

Similarly, the levels of Sonar allowed in various food products pose negligible risk to human health. For example, even if Sonar were present at the maximum allowable limit of 0.05 ppm in meat, poultry, eggs, and milk, a 70-kg adult would have to consume

almost 25,000 pounds of these foods daily (and again for a significant portion of a lifetime) to receive a dose equivalent to the dietary NOEL for Sonar. A child would have to consume over 7,000 pounds of these foods daily.

Because Sonar is used only intermittently in any one area, and because it disappears from the environment, there is virtually no way that anyone will be exposed continuously for a lifetime. Because the NOEL derives from a study involving daily exposures for a lifetime, the actual safety margin for people is, in fact, much greater than is suggested by the above illustrative examples.

Q9. How complete is the toxicology information upon which this conclusion rests?

A9. All toxicity studies required by the USEPA to obtain registration approval for Sonar have been completed.

Q10. What about the people who apply Sonar -- are they at risk?

A10. The Sonar label states that individuals who use Sonar should avoid breathing spray mist or contact with skin, eyes, or clothing; should wash thoroughly with soap and water after handling; and should wash exposed clothing before reuse. These precautions are the minimum recommendations for the application of any pesticide. If Sonar is used according to label instructions, exposures to the product should be minimal and use should pose negligible risks to applicators.

Sonar has been shown to be of low acute toxicity in laboratory animal studies (that is, toxicity from a high dose exposure for a short period of time). Therefore, any exposure to the product (even undiluted) that might occur during use is unlikely to lead to adverse effects as long as label instructions are followed. As discussed in Question #7, Sonar's label carries the signal word CAUTION that corresponds to the USEPA's lowest acute toxicity rating category.

Studies in laboratory animals show that the lethal dose from a single oral exposure of Sonar is greater than 10,000 mg/kg. To put this into perspective, an adult would have to drink over one million gallons of Sonar-treated water (at the 0.15 [150 ppb] ppm maximum allowable limit) to receive a dose of 10,000 mg/kg; a 20-kg child would have to drink approximately 350,000 gallons.

Because applicators are more likely to contact the undiluted material than the general population, questions about the toxicity of Sonar following direct skin contact have been raised. A laboratory study of the toxicity of an 80 percent solution of Sonar applied to rabbit skin (a standard model to predict effects in humans) suggests that Sonar is minimally toxic by this route. In this study, when Sonar was repeatedly applied to the skin of rabbits for 21 days (in the largest amounts that could be applied practically), there were no signs of toxicity and only slight skin irritation was observed. Further, the dermal administration of the 80 percent solution of Sonar did not induce sensitization in guinea pigs.

Q11. Has there been any investigation of the possible harmful effects of Sonar on fish, wildlife, pets and livestock?

A11. The toxicity of Sonar has been investigated in laboratory studies in birds (including the bobwhite quail and mallard duck), in the honey bee (as a representative insect) and in the earthworm (as a representative soil organism), in five different species of freshwater and marine fish, and in other aquatic animals. These studies have involved exposures to high concentrations for brief periods as well as exposures lasting as long as an entire lifetime, including during reproduction.

Extensive studies have also been performed to evaluate the effects of Sonar on various aquatic and terrestrial plants (both those considered undesirable aquatic weeds and those native plants that we wish to protect). Studies in laboratory animals designed primarily to assess potential health risk in humans are also relevant to the assessment of potential health effects in mammalian wildlife, livestock, and pets.

In addition, **Sonar** has been monitored in water, plants and fish during field trials. This provides firsthand information on residue levels in the environment following application of Sonar.

Q12. What do these investigations reveal?

A12. A combination of the toxicity studies and residue monitoring data reveals that Sonar poses negligible risks to aquatic animals including fish, wildlife, pets, and livestock when used according to label directions.

As was done with laboratory mammals, toxicity studies were conducted to establish a dietary no-observed effect level (NOEL) for birds. This maximum, non-toxic chronic dose is 1,000 ppm in the diet. One thousand (1,000) ppm is 2,500 times the highest average concentration of total residue found in fish (0.40 ppm), about 2,100 times the highest concentration found in aquatic plants (0.47 ppm), and about 11,500 times the highest average concentration of Sonar found in the water at field trial sites (0.087 ppm). Because the residue levels in these “bird food” items are so far below the NOEL, it can be concluded is that there are negligible risks to birds that might be exposed to Sonar in their diet following application of Sonar.

The highest average Sonar concentration found in Sonar-treated water is below the lowest NOEL values for both short and long term exposures from freshwater and marine fish. Honeybees and earthworms are not particularly sensitive to Sonar. Sonar caused no deaths in honey bees when they were dusted directly with the herbicide, and earthworms were not affected when they were placed in soil containing more than 100 ppm Sonar.

Extensive testing of Sonar in laboratory animals used to assess potential risks to human health indicates that a large safety margin exists for mammalian species in general. Thus, Sonar poses negligible risk to pets, livestock, and mammalian wildlife that might drink from water treated with Sonar.

Q13. Can Sonar be used in environmentally sensitive areas?

A13. Sonar has been used in a wide range of aquatic environments in the United States without incident for almost 10 years. Florida canals and rivers are examples of environmentally sensitive areas that have been treated with Sonar. Some sites are

habitats for the endangered Florida manatee. Although toxicity testing data for the manatee, or for other endangered species, cannot be collected directly, questions about whether Sonar treatment will pose any significant risk to the manatee can be answered with results of the mammalian toxicity studies.

The Florida manatee is an aquatic mammal that consumes up to 20% (one-fifth) of its body weight per day in aquatic plants. Treatment of canal water with Sonar according to label directions is expected to result in a maximum Sonar concentration of 0.15 ppm in the water and from 0.8 to 2.6 ppm in aquatic plants. Calculations show that it would be impossible for a manatee to ingest enough Sonar in its diet to cause any adverse effects, based on results of laboratory studies in other mammals. To reach the maximum non-toxic dose or NOEL for sensitive mammalian species, a manatee would have to drink more than 40 times its body weight per day in treated water, or eat at least 3 to 10 times its body weight per day in aquatic plants. This calculation indicates that treatment with Sonar in manatee habitats -- as one example of an environmentally sensitive area -- will pose negligible risk. In fact, application to Florida canals and rivers has been approved by the U.S. Fish and Wildlife Service, Florida Department of Environmental Protection, and the Florida Game and Fresh Water Fish Commission.

Sonar has also been used in other environmentally sensitive areas such as Disney World, Ducks Unlimited MARSH projects, Sea World, state and federal parks, and numerous fish and waterfowl management areas.

Q14. What is it that makes Sonar an effective aquatic herbicide while being a compound of relatively low toxicity to humans?

A14. Sonar inhibits a plant's ability to make food. Specifically, Sonar inhibits carotenoid synthesis, a process specific only to plants. Carotenoids (yellow, orange and red pigments) are an important part of the plant's photosynthetic (food making) system. These pigments protect the plant's green pigments (called chlorophyll) from photo degradation or breakdown by sunlight. When carotenoid synthesis is inhibited, the chlorophyll is gradually destroyed by sunlight. As a plant's chlorophyll decreases, so does its capacity to produce carbohydrates (its food source) through photosynthesis. Without the ability to produce carbohydrates, the plant dies.

Humans do not have carotenoid pigments. Therefore, the property of Sonar that makes it an effective herbicide at low doses does not affect the human body.

Q15. Will Sonar have an adverse effect on water quality?

A15. Extensive testing of a wide range of water bodies has shown no significant changes in water quality after Sonar treatment. In fact, Sonar has a practical advantage over certain other aquatic herbicides in this area. Specifically, the dissolved oxygen content of the water does not change significantly following Sonar treatment because the relatively slow herbicidal activity of the product permits a gradual decay of the treated vegetation. Maintaining adequate dissolved oxygen levels are critical to fish and other aquatic animals, which require oxygen to survive. This contrasts with the changes in water quality that can arise from the application of certain other aquatic herbicides that are "fast-acting." The sudden addition of large amounts of decaying plant matter to the water body can lead to decreased oxygen levels and result in a fish kill. To avoid depressions in dissolved oxygen content, label directions for certain "fast-acting"

aquatic herbicides recommend that only portions of areas of dense weeds be treated at a time. Because Sonar does not have any substantial impact on dissolved oxygen, it is possible to treat an entire water body with Sonar at one time.

Q16. Is there any reason for concern about the inert ingredients used in Sonar?

A16. Inert ingredients are those components of the product that do not exhibit herbicidal activity; that is, the components other than Sonar. Water is the primary inert ingredient in Sonar A.S., making up approximately 45% of the formulation. The second largest (approximately 10%) inert is propylene glycol; a compound used in facial creams and other health and beauty products. Other inert ingredients are added to serve as wetters, dispersants, and thickeners in the formulation. Trace amounts of an antifoaming agent and a preservative are also added. The primary inert ingredient in the pelleted formulations is clay, which makes up approximately 89% of the formulation. Small amounts of a binder or coating solution are also added to reduce the dustiness of the pellets. None of the inert ingredients in Sonar formulations are on the USEPA's list of "Inerts of Toxicological Concern" or list of "Potentially Toxic Inerts/High Priority for Testing." Thus, there is no reason for concern about the inert ingredients used in Sonar.

Q17. Is it important to follow label directions for use and disposal of Sonar?

A17. Yes. It is a violation of federal law to use products, including Sonar, in a manner inconsistent with product labeling or to improperly dispose of excess products or rinsate. Although the results of extensive toxicity testing in the laboratory and in field trials indicate a low order of toxicity to non-target plants, animals, and people, Sonar, like all chemicals, will cause adverse effects at sufficiently high exposure levels. Failure to follow label directions for use and disposal of Sonar could result in environmental levels that exceeds the tolerances for Sonar established to be protective of human health and the health of pets, livestock and other wildlife. In addition, improper use of Sonar could result in unintended damage to non-target plants.

Q18. If Sonar is used in conformance with label directions, is there any reason to be concerned that Sonar will pose risk to human health or the environment?

A18. As discussed in the answers to the previous questions, results of laboratory and field studies and extensive use experience with Sonar in a wide range of water bodies strongly support the conclusion that Sonar will pose negligible risks to human health and the environment when used in conformance with label directions.

In summary, it can be said that Sonar has a favorable toxicological profile for humans. It has an overall low relative toxicity and it is not a carcinogen, mutagen or reproductive toxicant. Sonar also has a very good environmental profile for an aquatic product because of: 1) its low toxicity to non-target organisms; 2) its non-persistent behavior when applied to water bodies (i.e., it readily breaks down to carbon, hydrogen, oxygen, nitrogen and fluorine); and 3) its low bioaccumulation potential, which means it does not build up in the body or in the food chain.

United States Environmental Protection Agency | Prevention, Pesticides And Toxic Substances (7508W) | EPA-738-F-93-011 September 1993

R.E.D. FACTS

Glyphosate

Pesticide Reregistration

All pesticides sold or distributed in the United States must be registered by EPA, based on scientific studies showing that they can be used without posing unreasonable risks to people or the environment. Because of advances in scientific knowledge, the law requires that pesticides which were first registered years ago be reregistered to ensure that they meet today's more stringent standards.

In evaluating pesticides for reregistration, EPA obtains and reviews a complete set of studies from pesticide producers, describing the human health and environmental effects of each pesticide. The Agency imposes any regulatory controls that are needed to effectively manage each pesticide's risks. EPA then reregisters pesticides that can be used without posing unreasonable risks to human health or the environment.

When a pesticide is eligible for reregistration, EPA announces this and explains why in a Reregistration Eligibility Decision (RED) document. This fact sheet summarizes the information in the RED document for glyphosate.

Use Profile

Glyphosate is a non-selective herbicide registered for use on many food and non-food field crops as well as non-crop areas where total vegetation control is desired. When applied at lower rates, glyphosate also is a plant growth regulator.

Glyphosate is among the most widely used pesticides by volume. It ranked eleventh among conventional pesticides used in the U.S. during 1990-91. In recent years, approximately 13 to 20 million acres were treated with 18.7 million pounds of glyphosate annually. The largest use sites include hay/pasture, soybeans and field corn.

Three salts of glyphosate are used as active ingredients in registered pesticide products. Two of these active ingredients, plus technical grade glyphosate, are contained in the 56 products that are subject to this RED.

The isopropylamine salt, an active ingredient in 53 registered products, is used as a herbicide to control broadleaf weeds and grasses in many food and non-food crops and a variety of other sites including ornamentals, lawns and turf, residential areas, greenhouses, forest plantings and industrial rights-of-way. It is formulated as a liquid, solid or pellet/tablet, and is applied using ground or aerial equipment.

The sodium salt of glyphosate, an active ingredient in two registered pesticide products, is used as a plant growth regulator for peanuts and sugarcane, to modify plant growth and hasten the ripening of fruit. It is applied as a ground spray to peanut fields and as an aerial spray to sugarcane. Preharvest intervals are established for both crops.

The monoammonium salt of glyphosate is an active ingredient in an additional seven herbicide/growth regulator products. This form of glyphosate was initially registered after November 1984, so it is not subject to reregistration or included in this RED. However, in reassessing the existing glyphosate tolerances (maximum residue limits in or on food and feed), EPA included those for the monoammonium salt.

Regulatory History

EPA issued a Registration Standard for glyphosate in June 1986 (NTIS PB87-103214). The Registration Standard required additional phytotoxicity, environmental fate, toxicology, product chemistry and residue chemistry studies. All of the data required have been submitted and reviewed, or were waived.

Human Health Assessment

Toxicity

Glyphosate is of relatively low oral and dermal acute toxicity. It has been placed in Toxicity Category III for these effects (Toxicity Category I indicates the highest degree of acute toxicity, and Category IV the lowest). The acute inhalation toxicity study was waived because glyphosate is non-volatile and because adequate inhalation studies with end-use products exist showing low toxicity.

A subchronic feeding study using rats showed blood and pancreatic effects. A similar study with mice showed reduced body weight gains in both sexes at the highest dose levels. A dermal study with rabbits showed slight reddening and swelling of the skin, decreased food consumption in males and decreased enzyme production, at the highest dose levels.

Several chronic toxicity/carcinogenicity studies using rats, mice and beagle dogs resulted in no effects based on the parameters examined, or resulted in findings that glyphosate was not carcinogenic in the study. In June 1991, EPA classified glyphosate as a Group E oncogen--one that shows evidence of non-carcinogenicity for humans--based on the lack of convincing evidence of carcinogenicity in adequate studies.

In developmental toxicity studies using pregnant rats and rabbits, glyphosate caused treatment-related effects in the high dose groups including diarrhea, decreased body weight gain, nasal discharge and death.

One reproductive toxicity study using rats showed kidney effects in the high dose male pups; another study showed digestive effects and decreased body weight gain. Glyphosate does not cause mutations.

In one metabolism study with rats, most of the glyphosate administered (97.5 percent) was excreted in urine and feces as the parent compound; less than one percent of the absorbed dose remained in tissues and organs, primarily in bone tissue. Aminomethyl phosphonic acid (AMPA) was the only metabolite excreted. A second study using rats showed that very little glyphosate reaches bone marrow, that it is rapidly eliminated from bone marrow, and that it is even more rapidly eliminated from plasma.

Dietary Exposure

The nature of glyphosate residue in plants and animals is adequately understood. Studies with a variety of plants indicate that uptake of glyphosate or AMPA from soil is limited. The material which is taken up is readily translocated throughout the plant and into its fruit. In animals, most glyphosate is eliminated in urine and feces. Enforcement methods are available to detect residues of glyphosate and AMPA in or on plant commodities, in water and in animal commodities.

85 tolerances have been established for residues of glyphosate and its metabolite, AMPA, in or on a wide variety of crops and crop groups, as well as in many processed foods, animal feed and animal tissues (please see 40 CFR 180.364, 40 CFR 185.3500 and 40 CFR 186.3500). EPA has reassessed the existing and proposed tolerances for glyphosate. Though some adjustments will be needed, no major changes in existing tolerances are required. EPA also has compared the U.S. tolerances with international Codex maximum residue limits (MRLs), and is recommending certain adjustments to achieve greater compatibility.

EPA conducted a dietary risk assessment for glyphosate based on a worst-case risk scenario, that is, assuming that 100 percent of all possible commodities/acreage were treated, and assuming that tolerance-level residues remained in/on all treated commodities. The Agency concluded that the chronic dietary risk posed by glyphosate food uses is minimal.

A reference dose (RfD), or estimate of daily exposure that would not cause adverse effects throughout a lifetime, of 2 mg/kg/day has been proposed for glyphosate, based on the developmental toxicity studies described above.

Occupational and Residential Exposure

Occupational and residential exposure to glyphosate can be expected based on its currently registered uses. However, due to glyphosate's low acute toxicity and the absence of other toxicological concerns (especially carcinogenicity), occupational and residential exposure data are not required for reregistration.

Some glyphosate end-use products are in Toxicity Categories I or II for primary eye irritation or skin irritation. In California, glyphosate ranks high among pesticides causing illness or injury to workers, who report numerous incidents of eye and skin irritation from splashes during mixing and loading.

EPA is not adding any personal protective equipment (PPE) requirements at this time, but any existing PPE label requirements must be retained.

The Worker Protection Standard (WPS) for Agricultural Pesticides (please see 40 CFR 156 and 170) established an interim restricted entry interval (REI) of 12 hours for glyphosate. The Agency has decided to retain this REI as a prudent measure to mitigate risks to workers. During the REI, workers may reenter areas treated with glyphosate only in the few, narrow exceptions allowed in the WPS. The REI applies only to glyphosate uses within the scope of the WPS, so homeowner and commercial uses are not included.

Human Risk Assessment

EPA's worst case risk assessment of glyphosate's many registered food uses concludes that human dietary exposure and risk are minimal. Existing and proposed tolerances have been reassessed, and no significant changes are needed to protect the public.

Exposure to workers and other applicators generally is not expected to pose undue risks, due to glyphosate's low acute toxicity. However, splashes during mixing and loading of some products can cause injury, primarily eye and skin irritation. EPA is continuing to recommend PPE, including protective eye wear, for workers using end-use products that are in Toxicity Categories I or II for eye and skin irritation. To mitigate potential risks associated with reentering treated agricultural areas, EPA is retaining the 12 hour REI set by the WPS.

Environmental Assessment

Environmental Fate

Glyphosate adsorbs strongly to soil and is not expected to move vertically below the six inch soil layer; residues are expected to be immobile in soil. Glyphosate is readily degraded by soil microbes to AMPA, which is degraded to carbon dioxide. Glyphosate and AMPA are not likely to move to ground water due to their strong adsorptive characteristics. However, glyphosate does have the potential to contaminate surface waters due to its aquatic use patterns and through erosion, as it adsorbs to soil particles suspended in runoff. If glyphosate reached surface water, it would not be broken down readily by water or sunlight.

Ecological Effects

Glyphosate is no more than slightly toxic to birds and is practically non-toxic to fish, aquatic invertebrates and honeybees. Due to the presence of a toxic inert ingredient, some glyphosate end-use products must be labeled, "Toxic to fish," if they may be applied directly to aquatic environments. Product labeling does not preclude off-target movement of glyphosate by drift. EPA therefore is requiring three additional terrestrial plant studies to assess potential risks to nontarget plants.

EPA does not expect that most endangered terrestrial or aquatic organisms will be affected by the registered uses of glyphosate. However,

many endangered plants as well as the Houston toad (due to its habitat) may be at risk. EPA is deferring any use modifications or labeling amendments until it has published the Endangered Species Protection Plan and has given registrants guidance regarding endangered species precautionary labeling.

Ecological Effects Risk Assessment

Based on current data, EPA has determined that the effects of glyphosate on birds, mammals, fish and invertebrates are minimal. Under certain use conditions, glyphosate may cause adverse effects to nontarget aquatic plants. Additional data are needed to fully evaluate the effects of glyphosate on nontarget terrestrial plants. Risk reduction measures will be developed if needed, once the data from these studies are submitted and evaluated.

Additional Data Required

EPA is requiring three generic studies (Tier II Vegetative Vigor, Droplet Size Spectrum, and Drift Field Evaluation) which are not part of the target data base and do not affect the reregistration eligibility of glyphosate. The Agency also is requiring product-specific data including product chemistry and acute toxicity studies, as well as revised Confidential Statements of Formula and revised labeling.

Product Labeling Changes Required

All end-use glyphosate products must comply with EPA's current pesticide product labeling requirements. In addition:

- **Protection of Aquatic Organisms**

Non-Aquatic Uses - End-use products that are not registered for aquatic uses must bear the following label statement:

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

Aquatic Uses - End-use products registered for aquatic uses must bear the following label statement:

Do not contaminate water when disposing of equipment washwaters and rinsate. Treatment of aquatic weeds can result in oxygen loss from decomposition for dead plants. This loss can cause fish kills.

- **Worker Protection Standard (WPS) Requirements**

Any product whose labeling permits use in the production of an agricultural plant on any farm, forest, nursery or greenhouse must comply with the labeling requirements of:

• PR Notice 93-7, "Labeling Revisions Required by the Worker Protection Standard (WPS)," and

- PR Notice 93-11, "Supplemental Guidance for PR Notice 93-7."

Unless specifically directed in the RED, all statements required by these two PR Notices must appear on product labeling exactly as instructed in the Notices. Labels must be revised by April 21, 1994, for products distributed or sold by the primary registrant or supplementally registered distributors, and by October 23, 1995, for products distributed or sold by anyone.

- **Personal Protective Equipment (PPE)**

No new PPE requirements must be added to glyphosate labels. However, any existing PPE requirements on labels must be retained.

- **Entry Restrictions**

Products Not Primarily Intended for Home Use:

- Uses Within the Scope of the WPS - A 12-hour restricted entry interval (REI) is required for all products with uses within the scope of the WPS, except products intended primarily for home use. The PPE for early entry should be that required for applicators of glyphosate, except any applicator requirement for an apron or respirator is waived. This REI and PPE should be inserted into the standardized statements required by PR Notice 93-7.
  - Sole Active Ingredient End-Use Products - Labels must be revised to adopt the entry restrictions set forth in this section. Any conflicting entry restrictions on current labeling must be removed.
  - Multiple Active Ingredient Products - Registrants must compare the entry restrictions set forth in this section to those on their current labeling and retain the more protective. A specific time period in hours or days is considered more protective than "until sprays have dried" or "dusts have settled."

- Uses Not Within the Scope of the WPS - No new entry restrictions must be added. However, any entry restrictions on current product labeling with these uses must be retained.

Products Primarily Intended for Home Use:

- No new entry restrictions must be added. However, any entry restrictions on current product labeling must be retained.

Regulatory Conclusion

The use of currently registered pesticide products containing the isopropylamine and sodium salts of glyphosate in accordance with the labeling specified in this RED will not pose unreasonable risks or adverse effects to humans or the environment. Therefore, all uses of these products are eligible for reregistration.

These glyphosate products will be reregistered once the required product-specific data, revised Confidential Statements of Formula and revised labeling are received and accepted by EPA.

Products which contain active ingredients in addition to glyphosate will not be reregistered until all their other active ingredients also are eligible for reregistration.

For More Information

EPA is requesting public comments on the Reregistration Eligibility Decision (RED) document for glyphosate during a 60-day time period, as announced in a Notice of Availability published in the Federal Register. To obtain a copy of the RED document or to submit written comments, please contact the Pesticide Docket, Public Response and Program Resources Branch, Field Operations Division (7506C), Office of Pesticide Programs (OPP), US EPA, Washington, DC 20460, telephone 703- 305-5805.

Following the comment period, the glyphosate RED document will be available from the National Technical Information Service (NTIS), 5285 Port Royal Road, Springfield, VA 22161, telephone 703-487-4650.

For more information about EPA's pesticide reregistration program, the glyphosate RED, or reregistration of individual products containing glyphosate, please contact the Special Review and Reregistration Division (7508W), OPP, US EPA, Washington, DC 20460, telephone 703-308-8000.

For information about the health effects of pesticides, or for assistance in recognizing and managing pesticide poisoning symptoms, please contact the National Pesticides Telecommunications Network (NPTN). Call toll-free 1-800-858-7378, between 8:00 am and 6:00 pm Central Time, Monday through Friday.

Washington State Department of Health

April 2004

Health Questions and Answers

On use of triclopyr to treat Eurasian watermilfoil

What is triclopyr?

Triclopyr *(pronounced tri–clo–peer)* is an herbicide that can control infestations of *Eurasian watermilfoil* and other invasive water plants. *E. watermilfoil* is more sensitive to triclopyr than many native pond weed species including coontail, rushes and cattails. Triclopyr can therefore be used at low concentrations to remove *E. watermilfoil* without killing many native plants. One triclopyr product is currently marketed for aquatic weeds under two names: Garlon 3A and Renovate 3. Both products contain mostly triclopyr and water. Other ingredients include ethanol, 3% triethylamine, and 2.3% ethylenediaminetetraacetic acid (EDTA). The whole product, including these other ingredients, is diluted more than 100,000-fold during an application for *E. watermilfoil*.

How toxic is triclopyr?

Only dilute amounts of triclopyr are needed to kill *E. watermilfoil*. These dilute concentrations have not been shown to cause skin irritation or other health effects. Triclopyr is not well absorbed through skin. If ingested, research has shown that low doses of triclopyr are rapidly excreted in humans and are unlikely to accumulate in human tissue or cause adverse effects. Concentrated triclopyr products are corrosive and can cause skin irritation and irreversible eye damage. Pesticide applicators must take care to protect their eyes and skin during the application.

In natural waters, the initial breakdown products of triclopyr are TCP and TMP.[1] Tests in laboratory animals on both these metabolites have shown that their toxicity to mammals is less than or equal to triclopyr. These metabolites are relatively short-lived in the environment. Complete breakdown of triclopyr results in carbon dioxide, oxamic acid, and other low molecular weight carboxylic acids.

Triclopyr is not considered by the EPA to be a cause of cancer, birth defects, or genetic mutations. Nor is it considered likely to cause systemic, reproductive, or developmental effects in mammals at or near concentrations encountered during normal human use.

[1] TCP is 3,5,6-trichloro-2-pyridinol. TMP is 3,5,6-trichloro-2-methoxypyridine

Washington State Department of Health considers it prudent public health advice to minimize exposure to pesticides regardless of their known toxicity.

How long will the herbicide last in the lake water?

In natural water, sunlight and microorganisms rapidly degrade triclopyr.

Triclopyr concentrations decline sharply over the first several days after treatment. Residues should be more than 95% degraded and dissipated from treated water in 1-2 weeks following treatment with triclopyr.

If Capitol Lake is treated with triclopyr, will I be exposed to this herbicide?

Residues of triclopyr and its metabolites should not be detectable in lake water more than a couple weeks past the application. Capitol Lake is not commonly used for swimming or other water play. If you do wade or swim in the lake, touch pets that have been in the lake, or eat fish from treated water shortly after the treatment, you may be exposed to dilute concentrations of triclopyr and its metabolites.

There is little chance of inhalation exposure to bystanders. This is because liquid triclopyr herbicide is injected directly into the water column. The application method eliminates opportunity for drift of sprays onto bystanders or nearby residents during the application. Triclopyr has a low vapor pressure and is quite water-soluble so it will not volatilize from treated water and drift through air following the application.

Is it safe to swim or play in the water following the herbicide application?

There are no swimming restrictions on the Garlon 3A or Renovate 3 labels following applications of triclopyr to water. This means that the federal Environmental Protection Agency (EPA) considers the treated water safe for swimming.

Washington State Department of Ecology recently contracted for an independent scientific assessment of triclopyr safety including this question of a swimmer's exposure. The worst-case scenario considered a 6 year-old who swims for 3 hours and inadvertently swallows 150 ml of water from the treated water immediately following an milfoil application with triclopyr. The estimated amount the child would absorb in this scenario was still more than 100 times less than the daily dose animals were fed over their lifetime with no observable adverse effects.

Washington State Department of Health (DOH) has reviewed the data and agrees that skin contact with treated water at the dilute treatment concentration is unlikely to result in any adverse health effect in people. Triclopyr products are concentrated when initially injected into water during an application so, as a precaution, DOH advises people to avoid contact with water

in treated areas for twelve hours following an application to allow the herbicide concentrate to disperse and reach the dilute treatment concentration.

Are fish from the treated area safe to eat?

One breakdown product of triclopyr, called TMP, can temporarily accumulate in fish and shellfish immediately following a triclopyr application. The EPA did not consider the concentration of this metabolite to be of health concern and requires no fishing restrictions.

Washington State Department of Ecology recently contracted for an independent scientific assessment of triclopyr safety including this question of eating fish from treated waters. Scenarios for children and adults consuming fish every day from treated water resulted in estimated exposures that were more than 1000 times less than the daily doses animals were fed over their lifetime with no observable adverse effects.

Has Triclopyr been tested for special sensitivity to children?

The EPA is required to assess each pesticide for its potential to cause toxicity specifically to infants and young children. This is because children's bodies are still developing and they may be more susceptible to the action of a toxicant. EPA conducted this assessment using animal tests and concluded "Reliable pre-and post-natal data indicate no special sensitivity of young animals to triclopyr residues."

FOR MORE INFORMATION CONTACT:

Washington State Department of Health
Office of Environmental Health and Safety - Pesticide Program
(360) 236-3360

National Pesticide Information Center
1-800-858-7378
This hotline provides pesticide information to the public and health care providers. Funding comes from state university cooperative extension and from the Environmental Protection Agency.

Risk Assessments of triclopyr that are available online:

http://www.epa.gov/oppsrrd1/REDs/factsheets/2710fact.pdf (fact sheet on triclopyr by EPA)
http://www.epa.gov/oppsrrd1/REDs/2710red.pdf (detail risk assessment of triclopyr by EPA)
http://www.ecy.wa.gov/pubs/0410018.pdf (Environmental Impact Statement for use of triclopyr on aquatic weeds, prepared by WA Dept of Ecology)