NSTAR Gas and Electric

2006 Vegetation Management Plan

Submitted To Natural Heritage

As required by the Massachusetts Endangered Species Act

#100

Section I

NSTAR's Five-Year Vegetation Management Plan 2003-2007

As Approved by MDAR

NSTAR

NSTAR Electric & Gas Corporation
Five-Year Vegetation Management Plan

2003 - 2007

THE COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS
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Calvin W. Layton
NSTAR Electric and Gas Corporation
One NSTAR Way
Westwood, MA 02090

August 26, 2003

Dear Mr. Layton:

Pursuant to 333 CMR 11.05 (5)(c) notice of approval of the NSTAR Electric and Gas Corporation, Vegetation Management Plan (VMP) as modified and recommended for approval by the attending members of the VMP Panel is hereby given.

This approval is subject to all the provisions of 333 CMR 11.00. It will remain in effect for the years 2003 through 2007.

Please be advised, any violation of the Massachusetts Pesticide Control Act, MGL, Chapter 132B or the Regulations promulgated thereunder, 333 CMR inclusive, may subject the responsible party or parties to agency action and referral of the matter to the Office of the Attorney General, Commonwealth of Massachusetts or the local District Attorney's office for civil or criminal prosecution.

Thank you for your time and efforts in this program.

Sincerely,

Douglas P. Gillespie
Commissioner

NSTAR Electric and Gas Corporation
Five Year Vegetation Management Plan

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A. Introduction

NSTAR Electric and Gas Corporation and its subsidiaries, headquartered in Boston, (hereafter referred to as "Companies") transmits and delivers electricity and natural gas to 1.3 million residential and business customers in over 100 Eastern Massachusetts communities. NSTAR submits this five year Vegetation Management plan in accordance with 333 CMR 11.00 (Appendix 1)

NSTAR is responsible for maintaining it's electrical and gas transmission and distribution Rights-of Way (ROW) in an environmentally safe and fiscally prudent manner that will insure system reliability, accessibility for maintenance and inspection activities, and public safety. The Company has a responsibility for ROW maintenance which encourages the natural development of low-growing woody shrub and herbaceous plant communities and to avoid any adverse impacts on the environment while controlling tall growing tree and undesirable shrub species that will interfere with the operation of the lines, if allowed to grow, causing power outages, extensive and costly damage to facilities, and severe inconveniences to populations in large geographic areas.

NSTAR's ROW extend from the Boston area South to Cape Cod and Martha's Vineyard, and to the west to New Bedford and Medway. The communities served are listed in Appendix 5, and a map is in Appendix 4.

B. Goals and Objectives

NSTAR's goal is to set forth a five-year Vegetation Management Plan (VMP) for ROW maintenance that encourages the natural development of low-growing woody shrubs and herbaceous plant communities, while avoiding adverse impacts to the environment. This five year plan will cover NSTAR Electric & Gas Corporation and its operating subsidiaries, Commonwealth Electric, Cambridge Electric, Boston Edison Company, and Commonwealth Gas. This plan will align the standard operating procedures for all vegetation management operations within NSTAR ROW.

Another objective of this plan is to document NSTAR's integrated pest management programs standards, practices and procedures, which are designed to control non compatible vegetation on ROW while reducing the risk of unreasonable adverse affects on human health and the environment. This document is further designed to provide overall guidance for the applicators contracted by NSTAR to physically accomplish the vegetation management program.

NSTAR's vegetation management goals and objectives are as follows:

1. To utilize an integrated pest management program designed to maximize control of undesirable vegetation while minimizing the use of herbicides through their judicious use. Judicious use of herbicides may range from no use of herbicides at all through exclusion or the encouragement of alternative land uses, to use of only certain herbicides, and /or to use only certain application techniques
2. To maintain an optimum maintenance cycle for our ROW of three to five years. (One treatment cycle may include several treatment methods.)
3. To ensure that all vegetation management operations are conducted in a safe effective manner and in compliance with federal and state laws regulations and permit conditions.
4. The ROW shall be maintained to their full cleared width. This may include the removal of trees or limbs adjacent to the ROW which endanger the line.
5. Wherever practical, to cooperate with landowners, whose land the ROW's cross, to facilitate alternative land use by the landowner that may reduce or eliminate the need for vegetation management by the Companies.
6. To remove or control non compatible woody vegetation within that cleared width of the ROW and around the perimeter of electric and gas substations.
7. To maintain visual buffers at certain visually sensitive sites.
8. To maintain protective buffers in environmentally sensitive sites.
9. At a minimum, to treat all public or private drinking water supplies, surface waters, wetlands, inhabited areas, agricultural areas, and road crossings as sensitive sites as specified in 333 CMR 11 (Appendix 1).

10. To use herbicide treatments as the preferred method of vegetation management, which will encourage biological control through competition from desirable plant species.
11. To hand cut or mow in order to protect environmentally sensitive sites and other areas where herbicide use is not permitted.
12. To employ appropriately certified and qualified contractors to implement NSTAR vegetation management programs.
13. To use professional Arborists and Foresters to coordinate contractor treatment crews and enforce NSTAR vegetation management policy and practices.
14. To have a company representative respond quickly to any questions or complaints from the public and/or government agencies that relate to ROW vegetation management.
15. To perform an annual review of NSTAR's vegetation management program to asses treatment effectiveness, environmental impacts, public safety and assure regulatory compliance.

C. Identification of Target Vegetation

There are three classes of vegetation that can affect the safe and reliable distribution of electricity and gas by the Companies.

The first targeted vegetation class is trees that grow within the cleared width of the ROW and are capable of growing into the electrical lines. Generally, tree species are defined as woody plants that mature at heights exceeding 15 feet. Trees that grow above 15 feet must be controlled because they are capable of growing or falling into the lines and causing electric service outages. Trees will be left In certain places where electric lines are high enough that tree species will not grow into them and will not interfere with the operation of the line. Tree species include, but are not limited to, maples, oaks, ash, cherries, and pines.

The second class of vegetation are trees, shrubs and vines that encroaching on existing roadways, pathways, or immediately adjacent to line structures. These structures also

include gas lines that need to be kept open for inspection and maintenance. This vegetation will be controlled to provide adequate access along the ROW and to structures and equipment. If no access along the ROW exists, a pathway may be created and maintained in a suitable location by treating all woody vegetation within the selected route. Woody vegetation must be removed in these areas to insure access to and along the ROW and line structures for safe, efficient inspection, maintenance and repair operations. Woody plant species to be controlled include all tree species previously identified plus shrub species that include, but are not limited to, viburnums, mountain laurel, bush honey suckle, grape vines, Virginia creeper, etc.

The third class of vegetation is certain woody plant species that pose other safety problems. These are plants have heavy thorns or have dermal toxicity and may create a hazardous environment to people working on or traversing the right way. Examples of these plant species include but are not limited to Multi-floral Rose, Greenbrier, and poison ivy.

All target vegetation will be identified visually by trained and experienced contracted vegetation management crews.

D. Methods of Vegetation Management and Rationale for Their Use

NSTAR will utilize seven methods of vegetation management on their ROW. These include hand cutting, mowing, foliar treatments, low pressure basal treatments, cut stump treatments, selective trimming, and tree growth regulators.

1. Hand Cutting

   Hand cutting consists of cutting target vegetation with either chain saws, brush saws, or other mechanical device. Vegetation is cut as close to the ground as practical and scattered so as not to exceed a depth of 2 feet. In certain instances the vegetation is piled or chipped at the discretion of NSTAR if it may create an obstruction on the ROW or have an objectionable visual impact.

The use of hand cutting is limited to similar sites that would be cut-stump treated, except that in the hand cut areas, one does not apply herbicide. These areas fall in certain sensitive areas, where herbicide use is prohibited, such as within 400 feet of a public well, 100-feet of a public surface water supply, or where the herbicide label prohibits it. In addition, hand cutting could be performed where the use of a CST herbicide might affect a desirable shrub or plant, or a garden or flower bed, depending upon the time of year, etc.

Hand cutting will only be used as necessary because when hardwood species are cut, and no herbicides are used, they re-sprout profusely, eventually forming dense, almost impenetrable thickets. This growth is so vigorous that extensive use of this technique will dramatically increase costs, may reduce electric service reliability and will reduce worker safety and required access on the ROW.

2. Mowing

Mowing consists of the shearing or cutting a target species using large mechanized cutting machines. These machines can be large rubber tired tractors or tracked vehicles with mechanized cutting heads or mowing decks. Selection of the specific equipment is based on terrain, target vegetation size, and site location. Rubber tired tractors are mostly used on sites with firm terrain. Wet sites usually require a tracked vehicle to allow for site access.

Mowing is typically used in areas where herbicide use is prohibited by regulation or easement restriction, or where a large number of targets species stems have exceeded maximum control heights, or access is inhibited by high woody vegetation density and that access is required in the short term, and where terrain, site size and sensitivity allow for the efficient use of the equipment.

Mowing may be used at any time of the year except when deep snow precludes operations. Mowing is only used as necessary for the same reasons outlined above in section 1. Hand Cutting

3. Foliar Treatments

Foliar treatment is spraying diluted herbicide onto the foliage and stems of selected target vegetation. Three types of equipment are used for foliar treatments: hand

pump backpack sprayers, motorized backpack sprayers, and hydraulic truck mounted sprayers. All treatments use low pressure sprayers for application (below 60 PSI at the nozzle)

Low pressure foliar treatments with hand pump backpack sprayers are used in low density target vegetation situations. The herbicide solution, which is commonly diluted to 3 -10% component of the total solution, is applied to wet the target plant. Motorized backpack application equipment is used in both low and high density vegetation this equipment generates a column of air which applies the solution, diluted as above, to lightly wet the target plant. Hydraulic truck mounted sprayers operate much like hand pumps only the pressure is generated by the motorized pump on the unit. The unit must be calibrated to deliver low pressure at the nozzle of around 60 PSI. This equipment is typically used in high density stands.

Foliar treatments are used within the cleared width of the ROW for tree and shrub target species below 12 ft. in height. Foliar treatments are generally not applied to conifer species. There are certain exceptions to this general guideline and will be identified in the Yearly Operational Plans. Foliar treatments are not used within visual buffers on targets greater than 6 ft. in height, within 100 ft. of a public water supply, within 50 ft. at the private water supply, within 10 ft. of standing surface water, or within 25 ft. of active crop plants gardens or pastures. Foliar treatments are allowed in wetland areas where no standing water is present as per the Department of Food and agricultural decision, dated October, 1995, which considered the wetland impact study conducted pursuant to 333 CMR 11.04 (4) (C) (2) (appendix 2)

Application foliar treatments is limited to the season when leaves are fully developed in the spring until early fall as leaves begin dropping off the trees approximately June 10 to September 20.

When foliar treatments are used according to NSTAR's application program, they are an effective and efficient method to control the whole target plant. This control reduces competition from sprout vegetation and encourages shrub and herbaceous growth that further inhibits and slows the invasion of non compatible tree species. This creates and maintains a diverse vegetative cover that minimizes vegetation management needs while providing an attractive site for wildlife and multiple users of the ROW by minimizing the density of target vegetation. By lowering density of target

species the maintenance cycle is lengthened which reduces impacts associated with periodic vegetation management operations.

4. Low Pressure Basal Treatment

   Low pressure basal treatment involves the selective application of herbicide, diluted in mineral oil to the entire lower 12-18 In. of the main stem of the target plants. Low pressure basal treatments are applied using hand pump back packet units. This treatment method can be used at any time of year excepting deep snow. The optimum treatment time frame is in the dormant season when application is easier due to the lack of foliage. Target vegetation density for this treatment should be low with average heights greater than 4 ft.

   Low pressure basal treatments have the same benefits as foliar treatments they reduce the density of target vegetation. Basal treatments have the added advantage of extending the yearly treatment period into dormant season, allowing for the workload to be spread over longer period of time. As motorized equipment is not used for this treatment it is not disturbing to landowners adjacent to the ROW and because it is typically done in the dormant season target vegetation is not browned out.

5. Cut Stump Treatment

   Cut stump treatments consist of applying herbicide by either squirt bottles or painting herbicide on freshly cut surfaces of mechanically cut stumps. The herbicide is limited to the freshly cut surface of the stump and the cutting procedure is the same as that outlined in Section 1 Hand Cutting

   This treatment is applied to the stump of hand cut target hardwood vegetation greater than 12 ft. in height that is capable of sprouting, and sprouting conifer species (pitch pine), taller than 2 ft., and visually sensitive sites, such as road crossings and residential areas, and in buffer zones adjacent to environmentally sensitive sites, such as active crop plants or gardens, swamps or marshes and active pastures. Stump treatment may be used at any time of the year provided snow depth is not such that it prevents cutting stumps below 3 in. in height. This treatment is part of NSTAR's integrated pest management program for the same reasons outlined above in Section 3 foliar treatments. This method is used within the ROW were maximum control of the herbicide is desirable and a reduction of visual impact of the vegetation management treatments is preferred.

6. Selective Trimming

Selective trimming consists of the mechanical pruning of encroaching limbs of tall growing tree species to prevent them from growing into or falling onto the lines or right-of-way. This trimming will be accomplished by using aerial lifts mounted on trucks or all terrain movers, or, If necessary, by hand climbing crews.

This trimming is limited to sites where visual buffers are desired to screen sub stations or company defined objectionable views and existing shrub growth does not provide adequate screening.

Selective trimming may be done at any time of the year.

This method is beneficial in providing visual buffers on the limited areas where tree buffers are desired and selective removals are not practical. Selective trimming may be required or more practical on certain state or town regulated road crossings. Selective trimming also provides landowners a viable alternative to otherwise mandatory removal of tree species undesirable for electric line maintenance and integrity but aesthetically desirable to the property owner.

All tree species left on the ROW will be done so at the sole discretion of NSTAR.

7. Tree Growth Regulators

Tree growth regulators (TGR's) are chemicals that slow or regulate the growth of a tree to minimize clearance pruning or removal. These materials are applied to the soil at the root collar by basal drench or soil injection. In certain situations TGR's eliminate the need for removal of target vegetation or repetitive trimming. As above this tool also provides land owners a viable alternative to otherwise mandatory removal of tree species undesirable for electrical line maintenance and integrity, but aesthetically desirable to the property owner.

8. Summary

Historically, low pressure foliar treatments have been used when herbicides were applied on ROW's in Massachusetts. In terms of total acreage treated with low pressure, foliar applications account for approximately 90% of the total acres treated. Low pressure basal treatments have been generally utilized on ROW with low density target vegetation and less than 100 ft. in width and traverse more populated areas. Basal applications account for approximately 2% of the total treatments and cutting, mowing and cut stump treatments are generally utilized on isolated sites, as

appropriate, throughout any given ROW in conjunction with the foliar treatments. These treatments account for approximately 5-10% of the total ROW acres treated.

E. Justification of Herbicide Applications

NSTAR Electric and Gas Corporation and its subsidiaries Commonwealth Electric and Boston Edison Company treated its rights-of-ways with herbicides from 1945 to the late 70's (Commonwealth) and early 90's (Edison). They converted from herbicide treatment methods to mechanical treatment methods because of a change in upper management philosophy in dealing with sensitive environmental issues. When treatments were ceased in the 70's and early 90's these rights-of-ways were low growing stable communities of native vegetation. Now between 10 and 20 years later much of the rights away are heavy carpets of thick and dense re-sprouted tree species that have to be mowed every three to four years.

Large scale mechanical mowing has created a negative environmental condition on NSTAR ROW's. The ROW's have become dominated by invasive species, which has diminished bio-diversity and threatens wildlife habitat and the adjacent minimally managed lands of others. Returning to an Integrated Pest Management (IPM) program that combines the selected and judicious use of approved sensitive site herbicides in Massachusetts (Appendix 3) with cultural (mechanical controls), and biological (stable vegetative communities) methods this IPM program will begin the process of the restoration of lost habitat and control these invasive species.

The long term objective of NSTAR vegetation management program is simply to create stable communities of early succession plant species. By achieving this goal the company will eliminate tall growing species for under its power lines, on its gas lines, and around it's stations, thus creating a benefit for both NSTAR and the natural environment.

To achieve this goal the selective use of herbicides is necessary and we present the following four justifications for their use:

1. Prevent Re-sprouting

When deciduous tree species are mechanically cut the root system survives and re-sprouts profusely. These trees will multiply so quickly and vigorously that they will eventually dominate a site, creating a dense community of tall growing tree species.

This condition currently exists on most of NSTAR ROW's. Herbicides prevent re-sprouting through control of the parent stem. This chemical control of the parent stem allows desirable vegetation to develop and out-compete the undesirable vegetation, and establish biological control.

2. Lower impact

The selective use of herbicides in low pressure applications and low in acute toxicity, approved by the state of Massachusetts for use in sensitive sites on ROW in accordance with 333 CMR 11 .04, has a low impact when combined with mechanical and biological methods.

These herbicide formulations used are low in acute toxicity (Harrison, 95), do not bio-accumulate (USDA Forest Service, 1984) and, as applied, have a short life span in the environment with very low soil mobility (Deubert, 1985). Selective and judicious use of herbicides do not adversely affect wetland plant composition or function, see DFA decision Appendix 2. In fact, mechanical vegetation control techniques used on the ROW result in significantly greater impact on wetland composition and function, E.C.I.,1989 and Nickerson et al.,1993. further, public exposure could be considered virtually negligible due to the high degree of control of the herbicide solutions inherent in the treatment methods and the behavior of the selected herbicides. The potentially major route for public exposure to these herbicides is through drift during foliar treatments. NSTAR vegetation management program eliminates the significant drift from foliar treatments by requiring the use of anti-drift agents in the herbicide mix, prohibiting treatments during high wind situations and setting maximum target height limits.

3. Safe

Mechanical cutting through the use mowers, chain saws, brush saws represent a higher risk to workers than herbicide application. Mowing machines will throw rocks and pieces of wood and other objects great distances, this presents hazards since it exposes both the workers and the public to safety risks from flying objects.

Chain saws are well known as one of the most hazardous hand tools in use and present a significant hazard to the operator. When cutting is completed with the use of these mechanical tools stumps are left on the right-of-way. The stumps are tripping

hazards to both workers and the general public, they can also punctured tires and damage equipment.

The dense vegetative thickets left by mechanical processes prevent access to ROW and cause hazardous conditions within themselves.

Workers equipped with the proper personal protective equipment can safely apply herbicides with selective low pressure equipment with minimal impact to the public and the environment.

4. Effective

Every mechanical control program results in a dense community of tall growing tree species. These dense stands of trees reduce biodiversity on the ROW, developing almost a monoculture of vegetation and wildlife. The result of IPM however, is a low growing plant community that will provide a biological control. This biological control is active by facilitating the spread of a dense cover of low growing vegetation that competes for light, moisture and nutrients. This competition inhibits the germination and growth of tree seedlings.

This biological control has a net environmental benefit of maintaining a diverse low growing plant community maintained through the selective use of herbicides. Reducing the density and inhibiting the growth of undesirable tree species decrease the amount of herbicide needed for vegetation control. Treatment cycles are lengthened and there are fewer undesirable species on the ROW that require control.

This reduction in target species and lengthening of the treatment cycle results in less site disruption and so reduces ecological and environmental impacts both long and short term. Diverse vegetation provides wildlife a habitat for more species and so generally increases total wildlife populations. Maintenance of this dense plant cover prevents the soil exposure and erosion that may result from rutting from mechanical treatments.

Promoting a relatively stable plant community and minimizing site disruption provides reduced environmental impacts. This program has the social benefits of creating a positive public perception of ROW's. Since the use of herbicides is reduced and the density and height of undesirable target species is very low, vegetation management operations have a low impact on existing plant community. Nearby residents are not significantly impacted by extensive foliar brownouts or drastic

changes in the ROW plant community that would occur with less selective herbicide or mechanical treatments. Further, the low growing vegetation provides a more open ROW with increased diversity of wildlife species, attractive flowering plants and berries.

Everyone benefits from IPM but it is important to re emphasize that the use of herbicides is not appropriate or necessary in all cases. Herbicides will not be used if site sensitivity, regulatory authorities new restrictions, or target species composition or height recommend otherwise. Herbicide treatments will not be used on target vegetation in standing water or within designated buffer zones around drinking water supplies. Regulatory or ROW easement restrictions prohibiting or restricting herbicide use will be honored.

Target species, such as non sprouting conifers, are generally not treated since herbicide treatment is not necessary for total control. Exceptions to this general guideline are made where White Pine regeneration has seeded in large thick "carpets" and mowing would be more destructive than herbicide application. In cases where large areas of high density target species have exceeded maximum herbicide treatment heights, it may be more practical to do a mechanical treatment followed in one or two growing seasons by a herbicide treatment to obtain effective control.

Specific herbicides and treatment methods to be used on any given ROW are selected based on site sensitivity and target species composition and density. Individual herbicides have different levels of effectiveness on target vegetation species. No one herbicide is equally effective on all target species and certain herbicides are more effective on certain target species than other herbicides. Further, most herbicides are formulated specifically for certain application methods and so treatments with those herbicides are limited to those methods. Similarly, individual treatment methods are not as effective or practical for control of certain target vegetation heights and densities. It is necessary to select the herbicide or a combination of herbicides conjunctively with the appropriate treatment method to obtain the most effective control of the specific target species composition and density on each right-of-way. Individual herbicides and treatment methods also have distinctive physical effects and environmental behaviors. For example, certain herbicides and treatment methods cause foliar brownout while others do not and

certain herbicides have been formulated for use in wet environments while others have not. The selection of specific herbicides or combinations of herbicides coupled with the appropriate treatment methods is made with equal consideration given to the visual or environmental sensitivity of a ROW or site within a right-of-way. In conclusion, there's no practical alternative to a properly planned and implemented integrated pest management program emphasizing the selective use of herbicides. Used properly, herbicides are relatively safe, efficient and effective in providing necessary control of targeted station and will not cause unreasonable adverse affects.

F. Sensitive Area Identification and Vegetation Control Strategies for Those Areas

1. Sensitive Area Identification

Sensitive areas are identified as public groundwater supplies, public surface water supplies, private drinking water supplies, surface waters, wetlands, inhabited areas, agricultural areas, and road crossings.

Each sensitive area has a defined limit for special protection to further minimize environmental and public health risks. The limit of each sensitive area is shown in the illustration in Appendix 7. within most sensitive areas there is an area in which herbicide use is prohibited (black zones) and larger area were herbicide use is permitted under certain conditions (referred to as a conditional herbicide use zone). These conditions, defined in 333 CMR 11 .04, require the use of herbicides and application methods recommended jointly by the DFA and DEP. More information on sensitive sites herbicides recommended by the DFA and DEP can be found in Appendix 3. The general characteristics of the sensitive area herbicides: low toxicity to humans and other animal species; short term soil persistence; bio degradation of active ingredients; and low soil mobility. Details on these characteristics are discussed in the DFA Herbicide Fact Sheets included in the annual YOP.

It is the policy of NSTAR to use only herbicides and application methods recommended for use in sensitive areas, as per 333 CMR 11 .04 (d), on the full length and width of all rights-of-ways to be treated. The operational effect of this policy is that the outer limits of sensitive areas (the conditional use zone) need not be identified in the field by treatment crews.

Sensitive areas: methods to identify them, and no herbicide and conditional herbicide use zones are illustrated in Appendix 7.

For the purpose of identification, sensitive areas can be separated into two categories: areas **not** readily identifiable in the field; and areas that **are** readily identifiable the field.

Sensitive areas **not** readily identifiable in the field include public water supplies, public surface water supplies and private wells. The method utilized to identify these sensitive areas will be as follows:

1) Consult the appropriate reference materials and sources (Section **F 2**) to determine the precise location of these areas.
2) Place the boundaries of the sensitive areas on United States Geological Survey (USGS) topographic maps.
3) With the required municipal ROW treatment notification letter, mail copies of the appropriate sections of these markup YOP maps to each municipality and solicit confirmation and input regarding the accuracy of these public and private water supply locations.
4) Prior to the ROW treatment, the boundaries of the sensitive areas will be transferred onto company strip maps. The strip maps usually have a scale of 1 in. = 200 ft. In addition, the list of identified private wells will be provided to the treatment crew.
5) The treatment crew will deploy a cutting crew with a point person in advance of the main herbicide application operation to locate and flag the boundaries of the sensitive areas and the appropriate buffer zones. These crews will also identify any private wells that are not shown on these maps and add new private wells to the list and YOP maps.

Sensitive areas that **are** readily identifiable in the field include surface waters, wetlands, inhabited areas, agricultural areas, and road crossings. The method utilized to identify these sensitive areas will be as follows:

1) Consult USGS (YOP) maps and company ROW strip maps to locate any of the sensitive areas that may already be identified on these maps.
2) The treatment crew will deploy cutting crew or point person in advance of the main herbicide application operation to locate and flag boundaries of

these sensitive areas or the appropriate buffer zone. The crews or persons will additionally identify any new sensitive areas than not shown on these maps. New sensitive areas will be marked on strip maps.

Sensitive areas not readily identifiable in the field include public ground water supplies and public surface water supplies. The method utilized to identify these sensitive areas will be as follows:

1) Consult the appropriate reference materials and sources (Section F2.) to determine the precise location of these areas.
2) Plays the boundaries of these sensitive areas on the United States Geological Survey (USGS) topographic maps.

2. Reference Materials and Sources of Information

Reference materials and sources to be utilized to identify sensitive areas include, but are not limited to the following:

- U.S. Geological Survey Topographic maps
- Company right –of-way strip maps (T sheets)
- Massachusetts Department Of Food Agriculture
- Massachusetts Department Of Environmental Protection Water Supply Maps
- Wetlands Conservancy Program Maps
- UMass Cartographic Institute
- Metropolitan District Commission
- Division Of Fisheries And Wildlife, Natural Heritage Program
- Municipal Maps or records, including information provided in response to the required municipal notification letters
- Meetings with municipal officials or ROW abutters prior to or during treatment operation
- Information provided a the company during the public review of the YOP
- Miscellaneous company and the vegetation management contractor records and local knowledge

3. Control Strategies

Control strategies to be utilized within and adjacent to sensitive areas are detailed in the illustrations in Appendix 7. In these areas where herbicides are prohibited (black zones), and cut and/or mow methods are used.

G. Massachusetts Endangered Species Act

The Massachusetts Endangered Species Act, MGL 131A, and regulations promulgated there under, 321CMR 10.00, sets fourth procedures for the listing of Endangered, Threatened, And Special Concern species native to Massachusetts, the designation of significant habitats for such species, and established rules and prohibitions regarding the activities which takes species or alter their significant habitats.

NSTAR have historically cooperated with various chapters of the Nature Conservancy and State Natural Heritage Programs to protect known sites were Endangered, Threatened, And Special Concern species (state listed species) are known to occur. To comply with the general provisions, 321CMR 10.00 Part I, NSTAR will submit this VMP for review by the Division Of Fisheries And Wildlife Natural Heritage And Endangered Species Program (NHESP). NSTAR shall apply Best Management Practices (BMP's) to all listed species and take all practicable means and measures to modify ROW vegetation management procedures to avoid damage to the state listed species and their habitats. This will be done in cooperation with NHESP, using guidance and information provided by them.

Provisions of 321CMR 10.00, Part II, allow NHESP to designate Significant Habit on any land, in the Commonwealth. NSTAR would be notified as an owner of interest in any Significant Habitat that incorporates right-of-way. No such designations have been made to date. Vegetation management activities within significant habitats require an alteration permit from the director of the division of fish and wildlife, 321CMR 10.00 Part III. NSTAR will, when it becomes necessary, seek such a permit under the coordinated permit review process of the Regulations, Section 10.38.

H. Operational Guidelines for Applicators Relative to Herbicide Use

Independent contractors are used by NSTAR for all vegetation management applications. These contractors are under contractual agreement to NSTAR to comply with all applicable state and federal laws and regulations. Contract performance and compliance with this plan will be monitored and evaluated by the company's Arborists.

1. Safety

   All contractors must comply with all applicable state and federal safety laws and regulations as a matter of contractual agreement with the Companies. This includes all applicable parts the Occupational Safety and Health Act (OSHA), ANSI Z133 standards, and all worker protection and safety related instructions on any chemical label.

2. Weather

   Inclement weather such as wind, rain, or snow will restrict the application of herbicides under certain conditions.

   a. Wind

      Excessive wind and can create drift during herbicide applications, and this drift, if it is significant enough, may cause damage to desirable vegetation on or off the right of way. Foliar treatments are most affected by the wind, basal or cut stump treatments are much less affected because they are applied in close proximity to the ground to a smaller target.

      To prevent significant target drift of herbicides, the applicant will comply with the following restrictions:

      1. If wind becomes strong enough to bend the tops of the main stems of tree species on the right of way, the contractor crew supervisor will closely observe the application of the foliar treatment to assure that there is no significant movement of the herbicide solution off target. If the supervisor observes significant movement of the herbicide off target, applications will immediately stop until the wind has subsided enough to permit further applications.

2. All herbicides solutions to be used for a foliar application will contain anti-drift agents. These anti-drift agents will be added to the foliar herbicides solution as per the agent label. The contractor supervisor may increase the anti-drift agent, at his discretion, as the wind speed increases, but he must still monitor for off target movement of herbicide solution and cease operations as applicable.
3. Foliar treatments will not be applied to target vegetation that exceeds 12 ft. in height.

b. Rain

All herbicide applications will be stopped during periods of moderate or heavy rainfall.

Foliar applications can be made, and are effective, in light mist conditions. When precipitation increases to the point where it is running off the surface of the leaf, all applications must stop as this will wash the herbicide off target. When foliar applications are stopped by rainfall the treatment will not resume until the rain ends and is not actively running off the surface of the leaf.

Basal applications are not affected during measurable rainfall. These applications that are stopped by rainfall will not be resumed until at least 50% of the application's zone of the target species is dry.

c. Snow

When snow depth exceeds an average of 6 in. on the ROW herbicide applications will cease. Deep snow covers the application zone for basal treatments and makes it difficult to cut stumps to an acceptable maximum height.

3. Equipment Calibration

In order to attain the proper coverage of a target species with an herbicide solution the application equipment must be properly calibrated. NSTAR contractors will use the following methods of calibration:

a. Foliar Treatments

Low pressure foliar application equipment will be adjusted to apply a spray pattern that will achieve effective control of the lowest rate. Pressure at the nozzle of hand pump backpack sprayers, and airspeed and controls on motorized backpack sprayers will be kept to the minimum setting required to transport the herbicide solution to the tops of each target and penetrate the foliage to the main stem of each target.

b. Basal Treatments

Basal treatment application equipment will use a calibrated Y-2 nozzle orifice. Hand pump pressures will be maintained at a minimum pressure required to adequately cover the lower 12-18 in. of the main stem of the target plant when applying the herbicide solution.

c. Cut Stump Treatments

Cut stump treatments squirt bottle applications will be adjusted to deliver the herbicide solution in a thin stream to the target zone.

4. ROW Treatment Area

All target vegetation within the cleared width of the ROW will be removed or controlled during a treatment operation. This includes all woody vegetation and vines growing on or encroaching upon roadways or trails or, on or within 10 ft. of structures within the cleared width of the right of way. Treatments will also extend around the perimeter of any sub stations. The only exceptions are as noted in Section 5. Trees in Yards or Trees Buffering Yards and Section 6. Visual Buffers.

5. Trees In Yards or Trees buffering Yards

Trees grown within the cleared width of the ROW that are located in yards or trees buffering yards will be pruned so as not to invade the conductor security zone within five years. These trees may also be removed at NSTAR discretion.

6. Visual Barriers

Visual buffers, consisting of trees and or shrubs, screen the general public from potentially objectionable views of structures and sub stations. They are maintained at sites where, in the opinion of the company, people may find the view of structures or sub stations objectionable. These sites include, but are not limited to, locations where ROW's cross roads, recreational areas, and inhabited areas.

Two types of visual buffers are used: shrub and tree/shrub.

Shrub buffers are left at most road crossings. All tree species will be removed. Shrub species that may grow into the conductor security zone within five years will also be removed.

Tree/shrub buffers are used only where sites are extremely sensitive visually and shrub growth is inadequate for screening. Tree or shrub with species that can be expected to invade the conductor security zone within five years will be removed. Selective trimming will be used where removal is prohibited or where an adequate buffer could not be maintained because too many trees would need to be removed to maintain the required five year conductor security zone clearance.

Cut stump treatment will be used on all woody vegetation (except non sprouting conifers) removed from visual buffers unless the buffer is within an environmentally sensitive area. In that case, restrictions on treatments within the environmentally sensitive area will take precedent.

Slash will be disposed of by dicing, chipping, or piling as per the approval of the Company.

7. Protective Buffers

Protective buffers consisting of specially treated zones, protect environmentally sensitive sites such as surface water (rivers, streams, Brooks, Lakes and ponds), public water supplies, private drinking water supplies, agricultural areas and inhabited areas. Vegetation management operations on such sites are designed to prevent any unreasonable adverse environmental impacts.

Specific dimensions for minimum protective buffers are set by state regulations, see illustration in Appendix 7.

These buffer zones will be maintained as per methods discussed in Section F 3, page 17.

Remove all slash and debris of cherry species immediately after treatment in active pastures to prevent any harm to livestock.

8. Slash disposal

Dicing, piling, or chipping will dispose of slash. Slash will not be left in waterways, trails or roads, in such a manner that would permit it to wash into these areas and no chips shall be left in wetlands. Slash from yards or recreational sites will be chipped or remove to adjacent areas and disposed of there.

Dicing will be accomplished by cutting the slash in pieces were it falls so that it lies close to the ground as practical. The diced slash should not exceed 2 ft. in height. This method is the preferred slash disposal practice.

Piling slash will be accomplished by grouping slash in isolated areas within a site. Piles should not exceed 2 ft. in height. Slash may be piled whenever other disposal methods can limit access to a site or when it has been removed from other sites.

Chipping is used on sites designated by the company when the dicing or piling it is prohibited or impractical. Wood chips will be removed or scattered uniformly over the site at depths not exceeding 4 in.

9. ROW Access

Access to a ROW will be through the use of established roadways whenever possible. Permission to enter a ROW by any other means must be obtained from the landowner by the contractor.

10. Sites under Alternate Land Uses

Sites will not be treated that are designated by the Company as landowner treatment sites, that are crop lands, Christmas tree farms, pastures or that are under any alternate land use such as lawns, athletic fields, pavement, etc. that makes vegetation management treatment by the company unnecessary. The contractor must inform the company whenever encountering alternate land use sites that have not been designated as such and marked on company maps.

11. ROW Vegetation Management Width

The company's integrated pest management program must be applied to remove or control all undesirable vegetation within the full cleared width of the right of way.

12. Vegetation Management program Effectiveness Standard

The vegetation management program applied to each ROW must result in 100% control or removal of all non compatible species greater than or equal to 6 ft. in height and a minimum 90% control or removal of all target species less than 6 ft. in height.

13. Identification of Sensitive Areas

Visually and environmentally sensitive sites must be buffered and treated according to procedures and specifications set forth in Section F. A person or crew who, in the opinion of the company, is qualified through training and performance in the field identification of these sensitive areas will be deployed in front of the treatment crew to identify sensitive sites and to designate the appropriate buffers. This person or crew will stay far enough in advance of the treatment group so that adequate time is allowed to mark these boundaries before the treatment crew reaches the area. The point person will make a reasonable effort to identify private wells within 100 feet of the ROW even if the property owner has not marked them.

14. Site Damage

Unreasonable side damage or destruction during any phase of the vegetation management operation by the contractor, his agents or employees, will be repaired immediately to the satisfaction of the company. The company will determine what constitutes unreasonable site damage.

15. Contractor Duties and Responsibilities

Vegetation management operations must be conducted according to this management plan and according to the written instructions of the company. The failure to do so is grounds for removal of the crew from the treatment site, by the company and termination of the contractors contract, at the discretion of the company.

1. The contractor is responsible for providing the following:

   a. Experienced and/or trained workers, who are appropriately licensed or certified. Workers must conduct themselves professionally at all times.
   b. Appropriately licensed or certified supervisors who are knowledgeable with regard to all aspects of the contracted treatment and who are responsive to the guidance of the company. Supervisors must be able to effectively communicate with the public. They must also effectively supervise contractor crews in order to ensure the satisfactory completion of the treatment operation and compliance with all appropriate standards and regulations.
   c. Compliance with all applicable Federal and State laws and regulations.
   d. Equipment, including backup equipment, which is sufficient to maintain the high as practical level of efficiency and effectiveness. Equipment must be maintained in good visual order and working condition.
   e. Herbicides, adjuvants, carriers and additives. (hereinafter collectively referred to as "materials"). Materials and mixture rates will be specified by the Arborist on a ROW by ROW basis. The specifications will not be deviated from without the approval of the Arborist. The contractor is responsible for the proper disposal of all access materials and solutions in accordance with all applicable Federal and State laws, regulations and guidelines.

16. <u>ROW Specification</u>

The Arborist will inform the contractor which ROW will be treated, the range of dates of treatment and the methods, materials and mixing rates to be used.
The company will provide maps with treatment restriction lists and written instructions outlining any special treatment considerations or instructions for each right of way.
No work will be done until the contractor has the appropriate maps, restriction lists and mixing rate instructions unless otherwise authorized by the company. All treatment crews must carry copies of this vegetation management plan and the yearly operational plan, a 100 ft. measuring tape and a 1:20 measuring scale.

I. Identification and Qualifications of Individuals Submitting This Plan

The Company is committed to high standards of environmental integrity. This plan has been developed by and overseen by NSTAR's three Senior Arborists, whose combined experience exceeds fifty years in the industry. They are as follows:

Calvin W. Layton
Senior Arborist
NSTAR Electric and Gas Corporation
One NSTAR Way
Westwood, MA 02090
Phone 781-441-8213

Mr. Layton has an A.S. degree in Arboriculture from Stockbridge School of Agriculture, a B.B.A. Degree in Business Management from The University of Massachusetts. Is Mass Certified Arborist #1130, Mass Pesticide Certification #4049, a member of the International Society of Arboriculture, Utility Arborist Association, Massachusetts Arborist Association, and the Massachusetts Tree Wardens and Foresters Association. He also serves on the Massachusetts Invasive Plant Group. He has worked for NSTAR since 2000 and before that worked for Vegetation Control Service, Inc of Athol, Mass. starting in 1984. He has extensive experience in integrated vegetation management program design and selective herbicide application.

William N. Hayes, Jr.
Senior Arborist
NSTAR Electric and Gas Corporation
One NSTAR Way
Westwood, MA 02090
Phone 781-441-3932

Mr. Hayes has a B.S. degree in Forestry Management/Arboriculture/Urban Forestry from the University of Massachusetts at Amherst. He is a Mass Certified Arborist #2105, International Society of Aboriculture (ISA) Certified Arborist # MI-0272 and Mass Pesticide Certified # 31372. Mr. Hayes is an active member of Mass Arborist Association, Mass Tree Wardens & Foresters Association, Southeastern Mass Tree Wardens & Arborists Association and N.E. ISA. He is also a member of Utility Arborist Association, Society of American Foresters and New England Wildflower Society. He has worked for NSTAR since January, 2001. Previous work experience is as Area

Manager at Townsend/N.G. Gilbert directing management of utility ROW accounts in Michigan, N. Indiana and N. Ohio. He has started and implemented herbicide programs for utilities such as Consumers Energy, American Electric Power, Detroit Edison, Duke Energy and many municipal and rural electric co-ops.

Paul Sellers
Senior Arborist
NSTAR Electric and Gas Corporation
One NSTAR Way
Westwood, MA 02090
Phone 781-441-3932

Mr. Sellers has an A.S. degree in Arboriculture from Stockbridge School of Agriculture. Is Mass Certified Arborist #1417, International Society of Arboriculture Certified Arborist #NE-0251, Mass Pesticide Certification #8164, a member of the International Society of Arboriculture, Utility Arborist Association, Massachusetts Arborist Association, and the Massachusetts Tree Wardens and Foresters Association. He also serves on the Massachusetts Urban Forestry Council, Massachusetts Tree Wardens Board and is currently the Vice President of the Southeastern Massachusetts Tree Wardens and Arborist Association. He has worked for NSTAR since 2000 and before that worked within the tree care industry.

The company would also like to acknowledge the assistance and cooperation of Thomas E. Sullivan, System Forester for the National Grid Company in allowing us to use parts of their VMP. Our service territories overlap in many communities and the coordination of these documents will allow for consistent standards in ROW management.

J. A Description of NSTAR Integrated Pest Management Program

The company accepts the following definition of Integrated Pest Management (IPM)

"IPM has been described as a system of resource management that attempts to minimize the interaction between the pest and the management system through the integrated use of cultural, biological, physical and chemical controls. Implementation of an IVM program utilizing modern ROW vegetation management techniques meets

this definition completely; IVM is a system of resource (vegetation) management that minimizes interaction between the pest (tall growing trees) and the management-system (safe and reliable electric service) through the integrated use of *cultural* (mechanical and manual methods that *physically* remove tree stems), *biological* (low growing plants and herbivory), and *chemical* (herbicides) controls." (K. McLoughlin)

Traditional IPM programs consist of five basic parts: preventive measures, biological controls, monitoring, assessment, and control measures. These essential elements of a sound Integrated Vegetation Management (IVM) program are illustrated in the following examples.

1. Preventive Measures

   When land on a ROW is used in a manner compatible with the electrical or gas facilities, this naturally precludes the growth non compatible vegetation. The most common land use example would be various types of agriculture. In addition to these agrarian activities of the types of allowable industrial commercial and residential multiple uses would be considered a preventive measure.

2. Biological Controls

   One of the major objectives of ROW vegetation management is to promote low growing stable plant communities, which consists of numerous species of Woody and herbaceous plants. These low growing plant communities inhibit both tree establishment and the subsequent growth by directly competing with the species for the available site resources of sunlight, water, and nutrients. These thick low growing plant communities hinder tree seed germination and the early development of small tree seedlings, acting as biological control agents in this IPM/IVM strategy.

   These stable communities of low growing vegetation are a cornerstone to maintaining bio-diversity on the ROW system.

3. Monitoring

   An IPM program calls for monitoring of the past population through the following methods:

   Regularly inspecting the area

Early detection of pests

Proper identification of pests

Noting the effectiveness of biological controls

Monitoring activities include an evaluation of the previous treatments to determine overall program effectiveness as well as the current condition of the area. This is to determine when the next treatment should occur and by what means.

These field inspections should be performed by people knowledgeable and identifying the undesirable tree species. This is a critical component of an IPM program. These inspections also serve as a very important quality control and quality assessment function of the program.

4. Assessment

The potential for pest populations (target trees) to reach an intolerable level has to be assessed to determine the most opportune time to eradicate the pest. For ROW's this time is well before target trees reach the height of the overhead electrical lines. For the right away manager an effective IPM program or strategy needs to prevent any interruption of electrical service and avoid risk of injury to the public and treat target species at their optimum height range of 5-10 ft. or as they emerge from lower growing plant cover. Target trees also should be removed before they become tall and dense and crowd out or alter the composition, structure and density of the desirable lower growing vegetative cover, and minimize any direct disruption by the treatments themselves to existing desirable plants so they continue to occupy the ROW and function as biological controls.

5. Control Measures

IPM strategy determines that once a pest population has reached the intolerable level action should be taken. Usually, under an IPM program, chemical pesticides are used as a control measure when no other strategies will bring the pest population back beneath the economic threshold.

For ROW vegetation managers the pest population consists only of target tree species that meets certain critical height characteristics. Once those trees have emerged from the lower growing plant community they need to be

selectively removed. This means that many smaller tree seedlings will be left untreated and will probably never reach maturity as the surrounding competitive pressures of lower growing desirable vegetation will control them.

K. Alternate land use of Rights-of-Way

Alternative land uses that are compatible with the operation of electric utility lines are encouraged on the company's rights-of-way. However, it may be necessary, before that land use is initiated, that NSTAR review the proposed use to determine whether it will interfere with the lines or otherwise violate the terms of the easement. Currently, land uses on ROW include such things as parking lots, golf courses, parks, driveways, roadways, crops, pastures, gardens, lawns and Christmas Tree Farms.
If a landowner desires to reduce or limit herbicide use through alternative land use practices, the company will consider each case on an individual basis.

L. Remedial Plan to Address Spills and Related Accidents

This section is offered as a general procedural guide for responding to chemical spills or related accidents. NSTAR retains independent, certified contractors who are responsible for all aspects of ROW applications, including containment, cleanup and reporting of chemical spills or accidents. NSTAR is not attempting to dictate the procedure but expects that all contractors will comply with the following minimum standards, while maintaining their own expertise in this area.

I. TYPES OF CHEMICAL SPILLS THAT REQUIRE ACTION:

A. Chemicals include, but are not limited to the following:

1. Herbicides
2. Bar and Chain Oil
3. Motor & Hydraulic Oil
4. Diesel Fuel
5. Gasoline

II. REQUIRED SPILL RESPONSE EQUIPMENT:

A. As a minimum, the ROW crew should have available on the job site:

1. MSDS and product labels

2. Appropriate absorbent material such as "speedi dri" or "soak up"
3. Shovel
4. Broom
5. Flagging
6. Leak proof container
7. Heavy-duty plastic bags

III. INFORMATION SOURCES:

A. The following sources of information are helpful in responding to a chemical spill:

1. Technical Reference Materials:

a. Product Label
b. Product Material Safety Data Sheet (MSDS)
c. Product Fact Sheet, if available

2. Manufacturers:

	TELEPHONE NUMBER	SPECIAL INSTRUCTIONS
BASF Corporation	(800)-832-4357	Arsenal product
E.I. du Pont de Nemours and Company	(800)-441-3637	Krenite & Escort products
Dow Agro Sciences	(800)-992-5994	Accord product
Helena Chemical Company	(901)-761-0050	Induce product
Sanag	(323)-245-6781	38F product

3. State Agencies:

STATE AGENCY	TELEPHONE NUMBER	SPECIAL INSTRUCTIONS
Massachusetts Pesticide Bureau	(617) 626-1700	A.S.A.P. (within 48 hours)
Massachusetts Department of Environmental Protection, Division of Hazardous Waste	Main Office: (888)-304-1133 (617)-292-5500	for emergencies involving reportable quantities of hazardous materials
Massachusetts Poison Information Centers	(800) 682-9211	for medical emergencies involving suspected or known pesticide poisoning symptoms
Massachusetts Dept of Public Health, Bureau of Env.Health Assessment Toxilogical Program	617-624-5757	

4. Emergency Services:

EMERGENCY SERVICE	TELEPHONE NUMBER
Massachusetts State Police, Central Office	(617) 566-4500 or 911
Local fire, police, rescue, board of health and emergency personnel	generally 911, except the boards of health
Chem Trec	(800) 424-9300

5. NSTAR's contact in the case of a spill or accident is:

System Control
NSTAR Electric & Gas Corporation
One NSTAR Way
Westwood, MA 02090-9230
(617)-541-7858
(617)-541-7825

IV. CLEAN-UP PROCEDURES:

Education and attention will constantly be directed at accident and spill prevention, however, in the event of an unfortunate incident the following suggestions may serve as a guideline:

A. **Major Spills** are those spills defined as reportable quantities of a hazardous material by the Massachusetts Department of Environmental Protection (DEP). The actions to be taken are in order:

1. Use any and all personal protective equipment as directed by product label or MSDS.

2. Identify source of spill and apply corrective action, if possible, stop or limit any additional amounts of spilled product.

3. Contain spill and confine the spread by damming or diking with soil, clay or other absorbent materials.

4. Report spill to the Massachusetts DEP and DFA.

5. If the spill cannot be contained or cleaned-up properly, or if there is a threat of contamination to any bodies of water, immediately contact any of the following applicable emergency response personnel (telephone numbers listed above).

   a. local fire, police, rescue and board of health personnel as listed in the YOP
   b. Mr. Dave Murray, during business hours
   c. Massachusetts DEP
   d. product manufacturer(s)
   e. additional emergency personnel

   If there is a doubt as to who should be notified, contact the Massachusetts State Police, Central Office at (617) 566-4500.

6. Remain at the scene to provide information and assistance to responding emergency clean-up crews.

7. Refer to the various sources of information relative to handling and clean-up of spilled product.

8. If possible, complete the process of "soaking up" with absorbent materials.

9. Sweep or shovel contaminated products and soil into leak proof containers for proper disposal at approved location.

10. Spread activated charcoal over spill area to inactivate any residual herbicide.

B. **Minor Spills** are defined as any spill involving less than reportable quantities of hazardous material. Minor spills are contained and cleaned up according to following steps listed above for Major Spills: 1, 2, 3, 7, 8 & 9 and contact the NSATR representative.

C. In the event of **Personal Contact** with hazardous chemicals:

1. Wash affected area with plenty of soap and water
2. Change clothing which has absorbed hazardous chemicals
3. If necessary, contact a physician
4. If necessary, contact the proper emergency services
5. If necessary, follow the procedures for Major or Minor Spills as outlined above
6. Avoid breathing the fumes of hazardous chemicals

D. **Related Accidents** include but are not limited to fire, poisoning and vehicle accidents.

M. Glossary

Allelopathic: Plants that produce and exude chemicals that inhibit growth of other plants

Applicator(s): The person or piece of equipment that physically applies the herbicide solution to the target vegetation.

Application Zone: Location on the target plant where the herbicide solution is applied

Conductor Security Zone: Specified area surrounding an electrical conductor into which encroachment of vegetation by growth or movement by wind or felling must be prevented. The radius of a zone is proportional to the voltage of the line.

Line: Conductor, structures and related equipment located on a ROW in order to transmit electricity.

Removal: Felling or killing of undesirable vegetation, or movement of slash and debris from one site to another.

Slash: All branches, tops, small diameter main stems and debris resulting from any cutting operation.

"T" Sheet: Strip map of a ROW showing line features.

Target Vegetation: Undesirable plants that will be removed or controlled during a treatment operation.

Undesirable Vegetation: Woody plants that have the ability to grow tall enough to enter the conductor security zone, that hinder access on roads or pathways along the ROW or immediately around line structures or that are toxic or thorny and create a safety hazard to workers.

APPENDIX 1

333 CMR 11.00

ROW MANAGEMENT REGULATIONS

333 CMR 11.00: RIGHTS OF WAY MANAGEMENT

Section

11.01: Purpose
11.02: Definitions
11.03: General Provisions
11.04: Sensitive Area Restrictions
11.05: Vegetation Management Plan (VMP)
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11.09: Right-of-Appeal
11.10: Penalties

11.01: Purpose

The purpose of 333 CMR 11.00 is to promote the implementation of Integrated Pest Management (IPM) Techniques and to establish those standards, requirements and procedures necessary to minimize the risk of unreasonable adverse effects on human health and the environment associated with the use of herbicides to maintain rights-of-way and to establish a statewide and uniform regulatory process. 333 CMR 11.00 establishes procedures which guarantee ample opportunity for public and municipal agency review and input on right-of-way maintenance plans.

11.02: Definitions

For the purpose of 333 CMR 11.00, the following definitions shall apply.

Agricultural Area, shall refer to, but not be limited to, actively cultivated gardens, greenhouses, orchards, fields, pastures, and other areas where herbicides might impact adversely on the vegetation under cultivation or agricultural management.

Applicant, shall refer to any person representing federal, state or local governments or agencies, utilities, railroads, pipelines, that intend to maintain a right-of-way by the application of herbicide.

Ballast, shall refer to the coarse gravel or crushed rock onto which the ties, tracks and any switching, signaling and communication devices of a railroad are laid.

Broadcast, shall refer to any non-selective herbicide application technique which results in application to all vegetation within a target area.

Department, shall refer to the Department of Food and Agriculture.

Foliar Treatment, shall refer to any technique which applies herbicide to leaves of the target vegetation.

Inhabited Area, shall refer to, but not be limited to residences, schools, hospitals, parks and recreational facilities or other areas in which humans generally live, work or gather.

Low Pressure, shall refer to pressure under 60 psi.

Maps, shall refer to maps which are of such accuracy and scale, as determined by the Department, to provide sufficient detail so that sensitive areas can be delineated, or which show bench marks or other permanent structures located on the right-of-way which allow the delineation of sensitive areas.

11.02: continued

Person, shall refer to, but is not limited to, an individual, association, partnership, corporation, company, business organization, trust, estate, the Commonwealth or its political subdivision, administrative agencies, public or quasi-public corporation or body, or any other legal entity or its legal representatives, agent or assignee, or a group of persons.

Person aggrieved, shall refer to any person who, because of an act or failure to act by the Department may suffer an injury in fact which is different either in kind or magnitude from that suffered by the general public and which is within the scope of the interests identified in 333 CMR 11.00. Such person must specify in writing sufficient facts to allow the Department to determine whether or not the person is in fact aggrieved.

Primary Recharge Area, that land area delineated by Zone II as defined in 310 CMR 24.06 or in such cases as when the primary recharge area has not been designated it shall be, in the interim, be defined as a one half mile radius from the public drinking water supply well unless otherwise determined by the Department of Environmental Protection.

Right(s)-of-Way (ROW), for the purpose of 333 CMR 11.00 shall refer to any roadway, or thoroughfare on which public passage is made and any corridor of land over which facilities such as railroads, powerlines, pipelines, conduits, channels or communication lines are located.

Selective Application, shall refer to the application of herbicide, in such a manner that the delivery to the target vegetation is optimized and delivery to non-target vegetation and the environment is minimized.

Sensitive Areas, shall refer to any areas, within rights-of-way, including but not limited to the following, in which public health, environmental or agricultural concerns warrant special protection to further minimize risks of unreasonable adverse effects:

(a) within the primary recharge area of a public drinking water supply well;
(b) within 400 feet of any surface water used as a public water supply;
(c) within 100 feet of any identified private drinking water supply well;
(d) within 100 feet of any standing or flowing water;
(e) within 100 feet of any wetland;
(f) within 100 feet of any agricultural or inhabited area.

Stem Treatment, shall refer to any technique including stump, basal, stem, injection, banding, frill, girdle and any other treatment which delivers herbicide at low pressure to the stump, base or stem of the target vegetation.

Target Vegetation, shall refer to any plant species which has the potential to interfere with the operation of the rights-of-way.

Touch-up Application, shall refer to limited application of herbicides following an initial treatment, which is necessary to achieve the desired vegetation control.

Vegetation Management Plan (VMP), shall refer to a long term management plan for the applicant's right-of-way system which describes the intended program for vegetation control over a five year period.

VMP Advisory Panel, shall refer to the Vegetation Management Plan Advisory Panel as set forth in 333 CMR 11.05(4).

Yearly Operational Plan (YOP), shall refer to the yearly operational plan which describes the detailed vegetation management operation for the calendar year consistent with the terms of the long term Vegetation Management Plan.

11.02: continued

Water Supply, shall refer to any raw or finished water source that is presently used, reserved for future use, or under investigation for future use by a public water system as defined in 310 CMR 22.02, or used as a source of private drinking water by one or more persons. This shall include all land and waters used as, or tributary to, a public water system except those exempted under 310 CMR 22.20.

Wetlands, with the exception of land subject to flooding shall refer to areas subject to protection under M.G.L. c. 131, § 40 which include the following areas as defined in 310 CMR 10.02(1)(a) - (c);

(a) Any bank, any freshwater wetland, any coastal wetland, any beach, any dune, any flat, any marsh, or any swamp bordering on the ocean, any estuary, any creek, any river, any stream, any pond, or any lake

(b) Land under any of the water bodies listed above

(c) Land subject to tidal action

11.03: General Provisions

(1) No person shall use an herbicide for the purpose of clearing or maintaining a right-of-way unless appropriately certified by the Department or unless appropriately licensed by the Department and working under the on-site supervision of an appropriately certified applicator.

(2) No person shall use an herbicide for the purpose of clearing or maintaining a right-of-way except in accordance with a Vegetation Management Plan (VMP) and a Yearly Operational Plan (YOP) as approved by the Department. Such documents shall be available at the work site at all times during herbicide applications and be made available to the Department and municipal officials including the Conservation Commission and Board of Health upon reasonable request.

(3) No person shall handle, mix or load an herbicide concentrate on a right-of-way within 100 ft. of a sensitive area.

(4) The perimeter of any sensitive areas which are not readily identifiable on the ROW shall be appropriately marked prior to any herbicide applications. The precise method used in marking these areas shall be identified in the VMP.

(5) No foliar application of herbicides shall be used to control vegetation greater than 12 ft. in height except for side trimming.

(6) No herbicide shall be applied when the wind velocity is such that there is a high propensity to drift off target and/or during measurable precipitation.

(7) No person shall apply herbicides by aircraft for the purpose of clearing or maintaining a right-of-way.

(8) No touch-up applications shall be carried out except under the following conditions:

(a) Touch-up applications must occur within 12 months of the date of approval of the YOP.

(b) The Department, the Conservation Commission, the Board of Health, and Chief elected official of the municipality shall be notified by certified mail at least 21 days prior to any application.

11.03: continued

(c) No more than 10% of the initially identified target vegetation on the applicant's right-of-way in any municipality may be treated and the total amount of herbicide applied in any one year shall not exceed the limits specified by the label or Yearly Operational Plan.
(d) The Department may impose such additional restrictions or conditions on the use of herbicides as it deems necessary to protect public health and the environment.

(9) The Department will maintain mailing lists of individuals and groups desiring to obtain notices on various aspects of the Program.

11.04: Sensitive Area Restrictions

(1) General
(a) No more than the minimum labelled rate of the pesticide product for the appropriate site, pest, and application method shall be applied.
(b) Herbicides applied in sensitive areas shall be applied selectively by low pressure foliar techniques or stem application.
(c) No person shall apply herbicides for the purpose of clearing or maintaining a right-of-way in such a manner that results in drift to any area within ten feet of standing or flowing water in a wetland or area within 400 feet of a public drinking water supply well; or area within 100 feet of any surface water used as a public water supply; or area within 50 feet of a private drinking water supply identified in accordance with 333 CMR 11.04(2)(c)(3).
(d) The Department, in cooperation with the Department of Environmental Protection, and subject to a Memorandum of Understanding will evaluate herbicides currently registered for use on rights-of-way and will distribute a list of herbicides recommended for use in sensitive areas and guidelines for their use. The Memorandum of Understanding will set forth a procedure for this evaluation based on all available data relative to environmental fate and toxicity. Such list, guidelines and procedures will be subject to review and comment by the Department of Public Health provided that such comments are provided to the Department within a reasonable time. The Department, on August 15 of the calendar year, will make available the list and guidelines to applicants and to the VMP Advisory Committee. Applicants proposing to use an herbicide which has been registered for use on rights-of-way but has not yet been evaluated pursuant to the provisions of the Memorandum of Understanding may request that such herbicides be evaluated pursuant to said provisions. For an herbicide which has been evaluated pursuant to the provisions of the Memorandum of Understanding, applicants proposing to use such herbicide in a manner inconsistent with the terms and conditions of use imposed in the guidelines may request a modification or waiver of such terms or conditions. A request for such modification or waiver shall provide a detailed rationale for use, including all relevant data including but not limited to environmental fate, efficacy and human health effects of the proposed herbicide. Such herbicides and/or uses shall be subject to the evaluation standards adopted by the Departments of Food and Agriculture and Environmental Protection in the Memorandum of Understanding.

Commentary

Applicants subject to the provisions of the Wetlands Protection Act, who wish to apply pesticides registered for use in Massachusetts to rights-of-way, may choose to apply herbicides determined to be suitable for use in sensitive areas in accordance with the provisions of the Memorandum of Understanding mentioned above or, alternatively, applicants may proceed pursuant to the provisions of 310 CMR 10.00 as authorized by M.G.L. c. 131, § 40.

11.04: continued

(e) The Department may impose such additional restrictions or conditions on the use of herbicides within or adjacent to sensitive areas as it determines necessary to protect human health or the environment. Such changes may be proposed by a municipal agency or individual during the public comment period.

(2) Water Supplies

(a) Public Ground Water Supplies

1. No herbicides shall be applied within 400 feet of any public ground water supply well.
2. No herbicides shall be applied within the primary recharge area of a public ground water supply well except under the following conditions:
   a. A minimum of 24 months shall elapse between applications; and
   b. Herbicides shall be applied selectively by stem application or low pressure foliar techniques.

(b) Public Surface Water Supplies

1. No herbicide shall be applied within 100 feet of any surface water used as a public water supply.
2. No herbicide shall be applied between 100 feet and 400 feet of any surface water used as a public water supply except under the following conditions:
   a. A minimum of 24 months shall elapse between applications; and
   b. Herbicides shall be applied selectively by low pressure foliar techniques or stem application.

(c) Private Drinking Water Supplies

1. No herbicide shall be applied on or within 50 feet of any private drinking water supply identified in accordance with 333 CMR 11.04(2)(c)(3).
2. No herbicide shall be applied between 50 feet and 100 feet of any private drinking water supply identified in accordance with 333 CMR 11.04(2)(c)(3) except under the following conditions:
   a. A minimum of 24 months shall elapse between applications; and
   b. Herbicides shall be applied selectively by low pressure foliar techniques or stem application.
3. It shall be the responsibility of the applicant to adhere to the sensitive area restrictions around identified private wells. The applicant shall consult with the Department to identify private wells that are located within 100 feet of the rights-of-way. The Department shall request the location of private wells along the right-of-way from the Department of Environmental Management and local Boards of Health. Wells identified to be within 100 feet shall be kept on file by the applicant for delineation on the maps in the YOP and be listed in the YOP. The VMP must include the method of locating identified private wells in the field prior to the application of herbicides.

(3) Surface Waters

(a) No herbicide shall be applied on or within ten feet of any standing or flowing surface water which is not a public water supply. No herbicides shall be applied between ten feet and 100 feet of any standing or flowing surface water which is not a public water supply except under the following conditions:

1. A minimum of 12 months shall elapse between application; and
2. Herbicides shall be applied selectively by low pressure foliar techniques or stem application.

(4) Wetlands

(a) No herbicide shall be applied on or within ten feet of a wetland.

(b) No herbicide shall be applied between ten feet and 100 feet of a wetland except under the following conditions:

1. A minimum of 12 months shall elapse between applications; and
2. Herbicides shall be applied selectively by low pressure foliar techniques or stem application.

11.04: continued

(c) Notwithstanding 333 CMR 11.04(4)(a), public utilities providing electric, gas, water, telephone, telegraph and other telecommunication services may apply herbicides on or within ten feet of a wetland in accordance with the following conditions:

1. Submission of a study, the design of which is subject to prior approval by the Departments of Food and Agriculture and Environmental Protection, evaluating impacts of proposed vegetation management programs on wetlands; and
2. A finding by the Department, after consultation with the Advisory Committee, that the proposed vegetation management program will result in less impacts to the wetland than mechanical control.
3. Notwithstanding the above, no herbicides shall be applied on or within ten feet of any standing or flowing water in a wetland.

(5) Inhabited and Agricultural Areas

(a) No high pressure foliar herbicide applications shall be carried out within 100 feet of any inhabited area or any agricultural area during the growing season.

(b) No foliar herbicide shall be applied within 100 feet of any inhabited area or any agricultural area during the growing season except under the following conditions:

1. A minimum of 12 months shall elapse between applications; and
2. Herbicides shall be applied selectively by low pressure foliar techniques or stem application.

11.05: Vegetation Management Plan (VMP)

(1) General.

(a) Unless otherwise specified by the Department, all VMPs should be submitted by the applicant no later than September 1 prior to the calendar year of the proposed first year of maintenance. All approved VMPs shall take effect on January 1 unless otherwise specified by the Department, and shall be effective for a five year period unless otherwise modified, or revoked by the Department.

(b) The VMP shall be presented on forms and/or format approved by the Department.

(2) Requirements. The VMP shall include but not be limited to the following:

(a) General statement of goals and objectives of the VMP.

(b) Identification of target vegetation.

(c) Intended methods of vegetation management and rationale for use, including vegetation control techniques, equipment proposed for use and timing of applications and alternative control procedures.

(d) Justification of herbicide applications proposed.

(e) Methods, references and sources for identifying sensitive areas and control strategies proposed for sensitive areas.

(f) Operational guidelines for applicators relative to herbicide use.

(g) Identification and qualifications of individuals developing and submitting a plan.

(h) A description of Integrated Pest Management Programs or other techniques/programs to minimize the amount and frequency of herbicide application.

(i) Description of alternative land use provisions or agreements that may be established with individuals, state, federal or municipal agencies that would minimize the need for herbicide, including the rationale for accepting or denying any reasonable request made by any individual.

(j) Remedial plan to address spills and related accidents.

(3) Public Notice, Review and Comment.

(a) Upon receipt of the proposed VMP, the Department shall schedule and hold appropriate regional public hearings affording all interested parties the opportunity to comment on the proposed plan.

(b) At least 21 days prior to the public hearings, the Department shall publish notice of the hearings in the Environmental Monitor and regionally located newspapers, and send notice to municipalities covered by the plan and to the appropriate mailing list. The notice will include locations where copies of the VMP can be reviewed.

11.05: continued

(c) The public shall have no less than 45 days, starting from publication of the Environmental Monitor notice, to comment upon proposed VMPs, unless the Department extends the comment period for good cause.

(d) At least 21 days prior to the end of the public comment period, the applicant shall send a copy of the proposed VMP to the chief elected official, the Board of Health and the Conservation Commission in affected communities upon their request.

(4) VMP Advisory Panel.

(a) There shall be a VMP Advisory Panel charged with the responsibility of reviewing Vegetation Management Plans and the accompanying public comments. The Panel shall recommend approval, denial or modification to the Department.

(b) The Panel shall consist of the Commissioner(s) or designees of the following Departments:

Department of Food and Agriculture, non-voting
Department of Environmental Protection
Department of Public Health
Department of Public Works and
Division of Fisheries and Wildlife, Natural Heritage Program
a representative appointed by the Commissioner of
DFA from each of the following groups:
Massachusetts Association of Conservation
Commissions;
Massachusetts Association of Health Boards;
University of Massachusetts/Extension Service;
railroads;
utilities;
applicator; and an
environmentalist

A member shall be appointed for a term of one, two or three years. Appointed members shall serve at the discretion of the Commissioner. No member shall serve more than six consecutive years. Appointed panel members shall serve without compensation and shall not be reimbursed for any expenses incurred by them in the performance of their duties. The Commissioner of the Department or designee shall serve as an ex officio non-voting member to the VMP Advisory Panel.

(c) The Department of Food and Agriculture's Representative shall chair the VMP Advisory Panel. This chairperson shall coordinate efforts of the Department and the Panel to process the VMPs.

(d) The VMP Advisory Panel shall conduct business in accordance with the time, place and procedures agreed upon.

(e) The VMP Advisory Panel shall review all complete VMPs including all written and public hearing comments. The Advisory Panel may, if necessary, request from the applicant additional information. Within 30 days of the end of the comment and review period, unless extended for good cause, the VMP Advisory Panel shall recommend to the Department in writing approval, denial or modification of each VMP.

(5) Disposition of VMP.

(a) 30 copies of the proposed VMP shall be submitted to the Department. The Department shall distribute copies of the proposed VMP to each member of the Advisory Panel.

(b) Within 30 days of the end of the public comment period unless extended for good cause, the VMP Advisory Panel shall review the VMPs and recommend in writing to the Department approval, denial or modification of each VMP; if necessary, the Panel may request from the applicant additional information.

(c) Within 21 days of the end of the VMP Advisory Panel review period, unless extended by the Department for good cause, the Department will notify the applicant and the Advisory Panel in writing one of the following:

1. request for additional information or modification; or
2. denial of VMP; or
3. approval of VMP.

11.05: continued

(d) The VMP may be modified, withdrawn or amended by the applicant through a written request sent by certified mail to the Department.
(e) Resubmission of a denied VMP, updating of a VMP, or a significant amendment to an approved VMP shall be processed according to 333 CMR 11.05.
(f) The applicant must send a copy of the approved VMP to the chief elected official, Board of Health, and Conservation Commission in each municipality covered by the plan.

(6) Time for Action. Non action on a Vegetation Management Plan within time specified herein does not constitute approval of the submitted plan. In the event that the Department fails to notify the applicant of a decision within the time specified above and upon written request from the applicant, the Commissioner must issue a finding within ten days of receipt stating the reason for the delay and providing an estimated completion date.

11.06: Yearly Operational Plan (YOP)

(1) General.
(a) The applicant is responsible for the accuracy and completeness of all information submitted with the YOP. The YOP shall be consistent with the objectives of the VMP and shall describe the intended operational program for that calendar year.
(b) The YOP shall be presented on forms and/or format approved by the Department.

(2) Requirements. The YOP shall include but not be limited to the following:
(a) Maps locating the ROW and Sensitive areas not readily identifiable in the field.
(b) Herbicides proposed including application rates, carriers, adjuvants.
(c) Herbicide application techniques and alternative control procedures proposed.
(d) The company which will perform any herbicide treatment.
(e) Identification of target vegetation.
(f) Individual representing applicant supervising YOP.
(g) Flagging methods to designate sensitive areas on the ROW.
(h) Herbicide Fact Sheets as approved by the Department.
(i) Procedures and locations for handling, mixing and loading of herbicide concentrates.

(3) Public Notice, Review and Comment.
(a) Upon submittal of the YOP for approval, the Department will publish a notice in the Environmental Monitor. Said notice shall be provided by the applicant and shall include the information on the municipalities through which the rights-of-way pass, a brief description of the intended program, and the procedure for public review and comment. The Department will distribute copies of the Environmental Monitor notice to the appropriate mailing list and the applicant.
(b) The applicant shall provide by certified mail under separate cover to the Board of Health, Conservation Commission and chief elected municipal official a copy of the proposed YOP and the Environmental Monitor notice for the city or town in which the herbicide treatment is proposed. The applicant shall maintain copies of the packet sent to municipalities and certified mail receipts as part of the recordkeeping requirements, 333 CMR 10.15.
(c) The Department shall allow a 45 day comment period on proposed YOPs, unless extended for good cause, commencing with the publication of the notice in the Environmental Monitor and receipt of the proposed YOP and Environmental Monitor notice by each municipality.
(d) The Department may approve, deny or modify YOPs after the 45 day comment period has expired.

(4) Disposition of YOP.
(a) The YOP shall be submitted by the applicant to the Department at least 90 days prior to the proposed commencement of application to allow completion of the comment period and review.
(b) The Department shall review the YOP to ensure that the YOP is consistent with the approved VMP. Any inconsistencies or deficiencies will be noted by the Department and returned to the applicant.

11.06: continued

(c) Where practical, the Department shall approve or deny the YOP within 90 days of receipt. The Department will provide notice of the decision to the applicant, municipal agencies and commentators in writing.

(d) The approved YOP in conjunction with the VMP shall govern the application of herbicide for a period not to exceed 12 months in accordance with other laws and regulations of the State and Federal governments and impose such conditions as necessary to minimize the risk of adverse effects on human health and the environment.

(5) Time for Action. Non action on a Yearly Operational Plan within the time specified herein does not constitute constructive approval of the submitted plan. In the event that the Department fails to notify the applicant of a decision within the time specified above and upon a written request from the applicant the Commissioner must issue a finding within ten days of receipt stating the reason for the delay and providing an estimated completion date.

11.07: Public Notification

The applicant shall provide by certified mail under separate cover, at least 21 days in advance of the application of herbicide to the right-of-way, a notice to the Department and to the Mayor, City Manager or Chairman of the Board of Selectman, the Board of Health, and the Conservation Commission in the municipality where the right-of-way lies. The notice shall include but not be limited to the approximate date on which such spraying shall occur, provided however, that said spraying shall not conclude more than ten days after said approximate date; a copy of a DFA approved Herbicide Fact Sheet on the active ingredient(s) of the herbicide(s) used; the name and address of contractor who will make the application or the name of the certified employee who will make the application.

This notice may run concurrently with the public notice and comment period in 333 CMR 11.06(3) provided the application is made after the close of the public notice and comment period and all modifications to the YOP are made before the application takes place and approval is granted by the Department.

11.08: Notice of Modification and Revocation

(1) The Department may suspend approval of any VMP or YOP, by written notice to the applicant and applicator, halting the application of herbicide to that right-of-way of the above mentioned YOP. After 21 days if the applicant does not request a hearing, the Department may revoke or modify the VMP and YOP, if it finds:

(a) that the terms, conditions of restrictions thereof, are being violated or are inadequate to avoid unreasonable adverse effects on the environment or on human health; or

(b) that the applicant has made a false or misleading statement in the VMP or YOP; or

(c) that the applicant has violated any provision of the Massachusetts Pesticide Control Act or FIFRA, or any regulations, standards, orders or license issued under either.

(2) Upon notice of revocation or modification, the applicant may modify the YOP by written request to the Department. Applications to modify the YOP shall be submitted in the manner set forth in 333 CMR 11.06 and disposed of in the manner set forth in 333 CMR 11.06. The Department may waive all or part of the requirement if it determines that the proposed changes do not significantly change the terms of the approved YOP.

11.09: Rights of Appeal

Any person aggrieved by the decision of the Department to approve, deny, modify or revoke a Vegetation Management Plan or a Yearly Operational Plan may request an adjudicatory hearing. The request for a hearing must be sent to the Department by Certified mail or hand delivered within 21 days after the date of decision or notice by the Department. At the same time the request for a hearing must be sent by Certified mail or hand delivered to the applicant and the Pesticide Board. The request should state clearly and concisely the facts of the proceeding, the reasons the decision is alleged to be inconsistent with 333 CMR 11.00 and the relief sought by the adjudicatory hearing. The adjudicatory hearing before the Pesticide Board shall be conducted as set forth in M.G.L. c. 30A and M.G.L. c. 132B, § 13.

11.10: Penalties

Any person who violates any provision of 333 CMR 11.00 shall be subject to the criminal and civil penalties set forth in M.G.L. c. 132B, § 14.

REGULATORY AUTHORITY

333 CMR 11.00: M.G.L. c. 132B.

APPENDIX 2

DEPARTMENT OF FOOD AND AGRICULTURE

WETLAND DECISION

COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS
DEPARTMENT OF FOOD AND AGRICULTURE
100 CAMBRIDGE ST., BOSTON, MA 02202 617-727-3000 FAX 727-7235

WILLIAM F. WELD
Governor

ARGEO PAUL CELLUCCI
Lt. Governor

TRUDY COXE
Secretary

JONATHAN L. HEALY
Commissioner

Decision Concerning The Wetland Impact Study Conducted Pursuant to 333 CMR 11.04(4)(c)(2)

PUBLIC UTILITY VEGETATION MANAGEMENT PROGRAM FINDING

Background

The Rights of Way Management (ROW) Regulations (333 CMR 11:00) promulgated in 1987 prohibit the use of herbicides to control vegetation along utility right of ways on or within ten (10) feet of a wetland unless the following conditions are met:

1. Submission of a study, the design of which is subject to prior review and approval of the Departments of Food and Agriculture and Environmental Protection, evaluating impacts of proposed vegetation management programs on wetlands; and
2. A finding by the Department, after consultation with the Advisory Committee, that the proposed vegetation management program will result in less impacts to the wetland than mechanical control.
3. Notwithstanding the above, no herbicides shall be applied on or within ten feet of any standing or flowing water in a wetland.

On April 28, 1988, The Departments of Food and Agriculture and Environmental Protection approved the scope of the study. In the fall of 1989, Environmental Consultants, Inc. submitted to the Department of Food and Agriculture the study entitled, "Study of the Impacts of Vegetation Management Techniques on Wetlands for Utility Rights-of Way in the Commonwealth of Massachusetts", dated June 1989. The Department consulted with the Vegetation Management Plan (VMP) Advisory panel at their November 15, 1989, December 7, 1989 and August 1, 1991 meetings.

The study provided some broad information of vegetation control along utility right of ways. The Department based its finding solely upon the narrow scope of whether the "proposed vegetation management program will result in less impacts to the wetland than mechanical control."

The following are the major evaluation points the Department considered in reaching its decision.

What are the Long-term and Short-term Impacts From Herbicide use and Mechanical Control?

Since wetlands are not a static, unchanging resource, there is some difficulty in determining the actual long-term impacts from the various vegetation control practices. The extent of wetland alterations must be the most important factor in determining impacts. With limited or selective removal of unwanted plant species in specific locations, it appears that long-term impacts are negligible. While mowing or foliar application can damage non-target species, neither control practice appears to result in adverse long-term impacts if they are carefully executed. Clear cutting, however, has a greater impact on wetlands since both wanted and nuisance species are removed.

Although there were some reservations about the sites that were chosen to determine the level of chemical residues, the study did show that there was not a buildup of background residues of herbicides applied from previous practices. However, there were some trace amounts of petroleum products - bar oil or hydraulic fluid found. The source of these petroleum products is unclear and may have been the result of public activities not related to vegetation management. Retrospective analyses for herbicide residues in previously treated wetland areas is not generally applicable since the herbicides used today are less persistent than those which were used previously. However, these analyses did indicate that the herbicides used in the past do not persist in the environment.

The study clearly demonstrated that adjacent non-controlled wetland areas did not differ significantly in composition and abundance of plant species from the controlled areas. The control practices did not appear to impact the entire wetland ecosystem, since a long-term comparison of wetland plant species composition between controlled and non-controlled sites did not differ significantly. Therefore, the long-term effects on the entire wetland ecosystem were considered negligible.

The determination of the short-term impacts to the wetland from the control practices was the most noted short-coming of the study. However, this was not part of the original scope. The VMP Advisory Panel felt, and the Department agreed, that a short-term environmental fate study would be needed.

The first study indicated that certain mechanical control practices can impact wetlands and disrupt the ecosystem to a greater extent than the judicious use of herbicides. While cutting may result in re sprouting of some unwanted vegetation in a manner unlikely to be encountered in unaltered wetland areas, unregulated mechanical vegetation control could result in the destruction of other non-target plant species.

What is the Impact to Non-target Wetland Plant Communities?

Basal and cut stump treatment with low mobility, short persistence herbicides that are judiciously applied usually do not impact adjacent plant species. Likewise careful selective mechanical cutting (versus mowing or clear cutting) also usually does not impact non-target wetland plants. The greatest potential risk to non-target wetland plants comes from mowing, clear-cutting, and high volume foliar applications. Low volume foliar applications in wetlands may also cause non-target impacts if application guidelines are not followed (e.g. no applications during high winds, or without using anti-drift agents, etc.).

Is There Enough Information on Which to Base a Finding?

As in most environmental assessments, a complete database is not available to answer all of the questions posed by the Department and the Vegetation Management Advisory Panel. Some of the questions posed were entirely valid, but were beyond the scope of the approved study.

The study did provide some clear evidence that selective mechanical and herbicide use does minimally alter wetlands by removing specific plant species. Mechanical mowing operations, however, can result in far greater short-term and potentially long-term impacts to wetlands since both wanted and un-wanted plant species are indiscriminately removed. Additionally, foliar herbicide applications may cause short-term impacts to non-target species.

The Department did not find any significant difference in wetland impacts between careful mechanical removal (selective hand cutting) of unwanted species

and, cut stump or basal treatment with herbicides.

There is no assurance that prohibiting the use of herbicides in wetlands will result in careful mechanical control. If herbicide use is prohibited in wetland areas, mechanical control in wetlands will be the only practice available to utilities. Financial pressures and other considerations may force Utilities to increase mowing and / or the use of more destructive non-chemical control practices due to a lack of alternative control techniques.

On August 29, 1991, the Department made a finding that the submitted study met the approved scope. However, although the study contained useful information, it was also determined that additional data needed to be gathered and analyzed because the study was inconclusive in a number of instances.

The Department issued a finding that a proposed vegetation program containing the specific elements listed does not pose an unreasonable adverse impact to wetlands. In addition, the Department required a study be conducted to provide important environmental fate data necessary for the long-term implementation of the rights of way program.

AUGUST 1991 FINDING

The Department of Food and Agriculture finds that a proposed vegetation program containing the following elements will not pose an unreasonable adverse impact to wetlands:

1. *The Integrated pest Management (IPM) system, as described in the Vegetation Management Plan and Yearly Operation Plan, is utilized in wetland areas. The IPM system must, at a minimum, place emphasis on encouraging low growth plant species to discourage unwanted vegetation and, minimizing the frequency and amount of herbicide use by only controlling specific non-conifer tree species which will impact transmission line operation and access to the right of way.*

2. *Herbicides may be applied by basal, cut stump or low volume foliar methods. Foliar applications must include the use of drift reduction agents. Foliar applications may only be conducted in situations where basal and cut stump treatments are not appropriate based on the size of the vegetation and potential for off-target drift. Foliar applications must not result*

in the off-target drift to non-target species.

3. *Herbicides are not applied to conifer species (pine, spruce, fir, cedar and hemlock).*

4. *Carriers for herbicides do not contain any of the following petroleum based products: jet fuel, kerosene or fuel oil. Carriers will be subjected to review by the Department of Food and Agriculture and DEP through 333 CMR 11.04(1)(d).*

5. *Herbicides must be recommended by the Department of Food and Agriculture and DEP through 333 CMR 11.04(1)(d).*

6. *Herbicides may only be applied by hand operated equipment containing no more than 5 gallons of diluent.*

7. *All other restrictions within sensitive areas remain in effect. In accordance with 333 CMR 11.04(1)(c), no person shall apply herbicides for the purposes of clearing or maintaining a right-of-way in such a manner that results in drift to any areas within 10 feet of standing or flowing water in a wetland or area within 400 feet of a public drinking water supply well; or area within 100 feet of any surface water used as a public water supply; or area within 50 feet of a private drinking water supply identified under 333 CMR 11.04(2)(c)(3).*

8. *Approved Vegetation Management Plans and Yearly Operation Plans must be amended as needed to reflect the conditions of this FINDING.*

9. *The Department further requires that environmental fate data be provided by the utilities that are applying herbicides to rights-of-way, which characterizes the movement of herbicides applied to wetland areas under these conditions. The Department further requires that all study protocols be reviewed by the Vegetation Advisory Panel and be approved by the Department of Food and Agriculture and the Department of Environmental Protection. Failure to submit the required information by the dates outlined in the schedule below will render this finding void.*

An approvable scope of the study developed and

submitted by January 1, 1992.

Field data submitted to DFA by October 1, 1992. Data must be consistent with the requirements of the approved scope.

Draft study report submitted to DFA by October 1, 1993.

Final Report submitted to DFA by March 1, 1994.

10. *The Department reserves the right to amend or withdraw its FINDING at anytime if it determines that the use of herbicides in wetland areas poses a greater impact than mechanical control or may pose an unreasonable adverse effect to humans or the environment.*

11. *This finding expires December 31, 1994.*

Therefore, herbicide use may be allowed to control certain vegetation along utility right of ways if the proposed vegetation program as described in the approved Vegetation Management Plan and, Yearly Operational Plans contains the above elements.

On, April 27, 1992, the Departments of Food and Agriculture and Environmental Protection approved the scope of the *"Study of Fates of Herbicides in Wetlands on Electric Utility Rights of Way in the Massachusetts Over the Short Term"*. The final report was submitted to the Department of Food and Agriculture December 31, 1993. The Department began reviewing the report in consultation with the VMP Advisory panel.

At the end of 1994, the Department had not completed its review. Therefore, on December 22, 1994 the Department extended the current finding for one year (to December 31, 1995) or until such time it is able to make a final determination, whichever occurs first.

Fates of Herbicides Over the Short Term Study

The objective of this study was to determine the short term environmental fate and assess the impacts of selected herbicides applied by four common Right-of-Way management techniques. Additionally, the study evaluated which of the four Right-of-Way management techniques provides the most effective control of target vegetation and which techniques produced the least impact on the non-target plant community, and consequently the least alteration of wooded wetland community.

The study investigated the environmental fate of two herbicides, which are typically used to control vegetation on ROWs, and are included in the list recommended for use in sensitive areas. These herbicides were chosen, among other reasons, for their use patterns, size of area treated, and application rates. Accord, which contains the active ingredient glyphosate, is the primary herbicide used for cut stump treatment and is also used for foliar application. Garlon 4, which contains the active ingredient triclopyr, is the primary herbicide used for basal applications. Collectively these products represent the typical herbicides used to control vegetation on ROWs.

Results

A summary of the most important findings and conclusions of the study include:

* Based upon the samples collected immediately after application, at 1 week, 1 month, 3 months and 1 year:

  - The two herbicides, glyphosate and triclopyr degrade rapidly. Residues reach low quantities quickly, often less than detection limits, within a year.; and
  - There is essentially no movement either laterally or vertically from the treated sites by glyphosate. Triclopyr does not move laterally, but was noted to move vertically in small amounts.

* Drift cards indicate that the herbicides are neither splashed nor carried any distance by the wind. Glyphosate drift is not a significant problem resulting in slight effects on neighboring vegetation and are not detectable in the next year's growth. Sphagnum moss next to trunks treated basally with triclopyr were killed within three months in a 15 cm diameter circle immediately around the target tree, but the dead circle did not continue to enlarge.

* Filter paper recovered immediately after application of herbicide showed that all methods of application deposit herbicide on the ground. Treated bare soil samples showed as consistent a drop in herbicide concentrations and as little vertical movement as did samples beneath target trees.

* The use of the herbicides glyphosate and triclopyr at the strengths and application rates used does not pose a risk of accumulation in organically rich soils.

* Herbicide concentrations in soil continue to decline as time advances.

* Rainfall occurring more than a week after application does not appear to spread the herbicide nor does groundwater carry any substantial fraction of what has been applied to a particular site down into the soil or horizontally.

* Based upon the results of the study, an assessment of the environmental fate, and observations of both treatment effectiveness and non-target impacts, an effective and environmentally sensitive ranking from most effective and posing least potential environmental risks to least effective and posing the most environmental risk is suggested:

1. Most effective control and exclusive effect on target:
   low-volume foliar (with glyphosate).

2. Most consistent control with lethal effects on bordering vegetation:
   high-volume foliar (with glyphosate)

3. Total control with rings of dead vegetation around treated trunks:
   low-volume basal (with triclopyr)

4. Incomplete target control and leaving largest soil residues:
   cut-stump (with glyphosate)

It is important to note that the results of the second short term study suggest that the most efficacious application techniques and which pose the lowest environmental risk were not those recommended in the interim finding.

DEPARTMENT DETERMINATION

Based upon the results of the two ROW impact studies, the general information in the literature, and after consultations with the Vegetation Management Panel, the Department finds that the following proposed vegetation management program will result in less impacts to wetlands than exclusive use of mechanical control methods. Therefore, the Department finds that any vegetation management program that incorporates the conditions under which the study was conducted as well as taking into account the results of previous studies, will result in the least impacts to wetlands.

These conditions include:

1. An Integrated Pest Management (IPM) system, also known as Integrated Vegetation Management (IVM), as described in the Vegetation Management Plan and Yearly Operation Plan is utilized in wetland areas. The IPM system must, at a minimum, place emphasis on encouraging low growth plant species to discourage unwanted vegetation and, minimizing the frequency and amount of herbicide use by only controlling specific non-conifer tree species which will impact transmission line operation and access to the right of way.

2. Herbicides may be applied by low volume foliar, basal, or cut stump methods. Foliar applications must include the use of appropriate drift reduction agents, and must not result in the off-target drift to non-target species. Basal and cut-stump treatments may be conducted in those situations where the size of the vegetation, potential for off-target drift, or other considerations precludes the use of low-volume foliar applications. Cut stump and basal applications shall be restricted, when practicable, to periods when static ground water levels are low or otherwise when conditions are less susceptible to potential contamination.

3. Herbicides are not applied to conifer species (pine, spruce, fir, cedar and hemlock).

4. Carriers for herbicides do not contain any of the following petroleum based products: jet fuel, kerosene or fuel oil. Carriers will be subjected to review by the Department of Food and Agriculture and DEP through 333 CMR 11.04(1)(d).

5. Only herbicides recommended by the Departments of Food and Agriculture and Environmental Protection through 333 CMR 11.04(1)(d) may be used in sensitive areas.

6. Herbicides may only be applied by hand operated equipment containing no more than 5 gallons of diluent.

7. All other restrictions within sensitive areas remain in effect. In accordance with 333 CMR 11.04(1)(c), no person shall apply herbicides for the purposes of clearing or maintaining a right-of-way in such a manner that results in drift to any areas within 10 feet of standing or flowing water in a wetland or area within 400 feet of a public drinking water supply well; or area within 100 feet of any surface water used as a public water supply; or area within 50 feet of a private drinking water supply identified under 333 CMR 11.04(2)(c)(3).

8. A minimum of twelve months must elapse between herbicide treatments. Only touch-up applications may be performed between twelve and twenty four months.

9. Approved Vegetation Management Plans and Yearly Operation Plans must be amended as needed to reflect the conditions of this determination.

.....

Therefore, herbicide use may be allowed to control certain vegetation along utility right of ways if the proposed vegetation program as described in the approved Vegetation Management Plan and Yearly Operational Plans contains the above elements.

Jonathan Healy, Commissioner

10/12/95
Date

APPENDIX 3

RECOMMENDED HERBICIDES IN SENSITIVE AREAS

The company will adhere to the current list of "approved" herbicides for use in sensitive areas on ROW published by the **Department of Food and agriculture** and the **Department of Environmental Protection.**

Furthermore, the company we'll adjust its program to meet any changes in the department's list of approved herbicides for use in sensitive areas.

MASSACHUSETTS PESTICIDE BUREAU
RIGHTS-OF-WAY SENSITIVE AREA MATERIALS LIST
(April 2003)

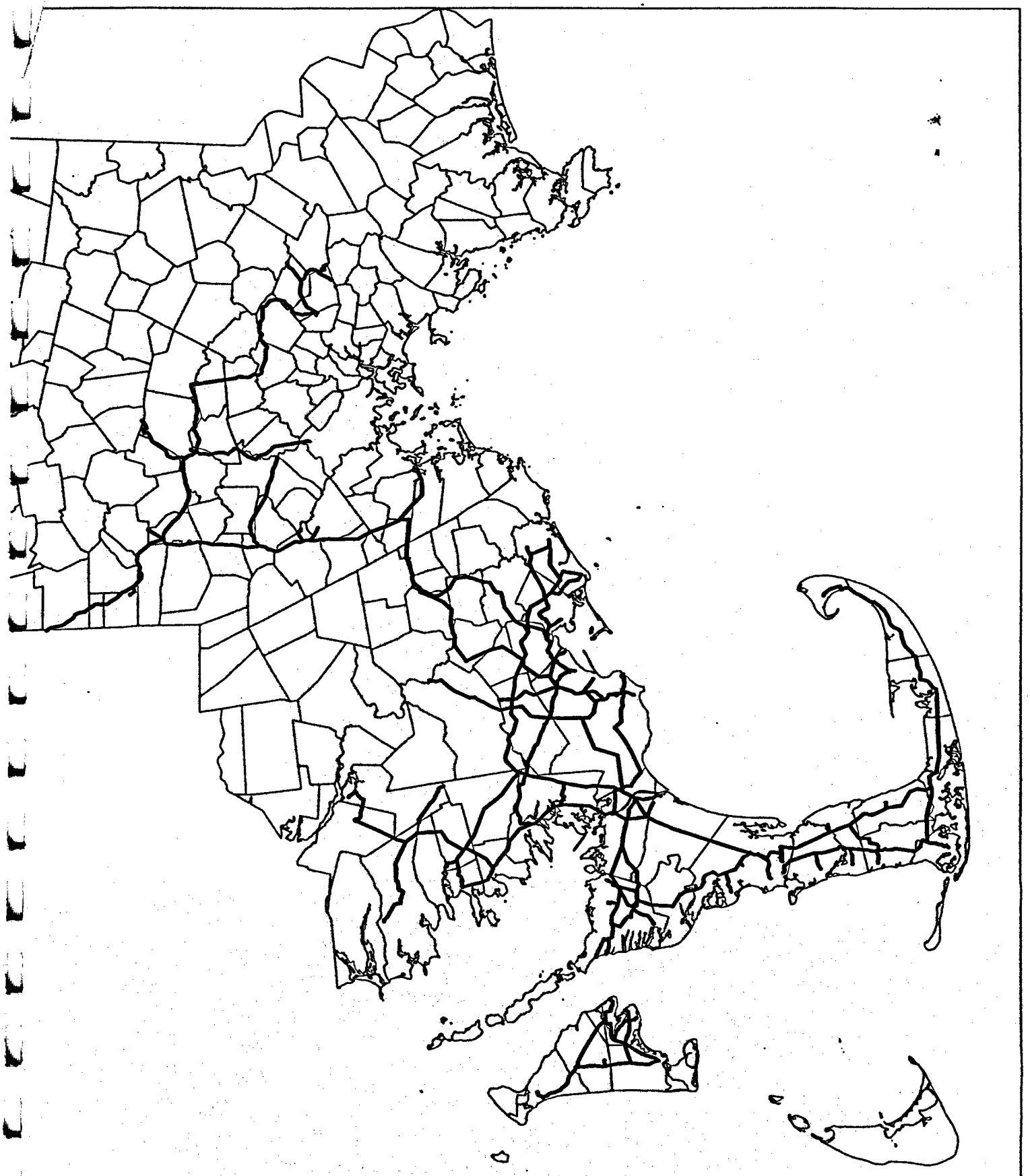
Trade Name, *Registrant*	EPA Registration Number	Active Ingredient	Use Restrictions
Accord *Monsanto*	524-326	Glyphosate	Lowest Labeled Rate
Accord Concentrate *Monsanto*	524-343	Glyphosate	Lowest Labeled Rate
Rodeo *Monsanto*	524-343	Glyphosate	Lowest Labeled Rate
Round-Up Pro *Monsanto*	524-475	Glyphosate	Lowest Labeled Rate
Accord SP *Dow AgroSciences*	62719-322	Glyphosate	Lowest Labeled Rate
Accord Concentrate *Dow AgroSciences*	62719-324	Glyphosate	Lowest Labeled Rate
Glyphosate VMF *El DuPont*	352-609	Glyphosate	Lowest Labeled Rate
Escort *El DuPont*	352-439	Metsulfuron-methyl	Lowest Labeled Rate
Escort XP *El DuPont*	352-439	Metsulfuron-methyl	Lowest Labeled Rate
Krenite S *El DuPont*	352-395	Ammonium Salt of fosamine	Lowest Labeled Rate
Oust XP *El DuPont*	352-601	Sulfometuron methyl	Lowest Labeled Rate
Oust *El DuPont*	352-401	Sulfometuron methyl	Lowest Labeled Rate
Arsenal *American Cyanamid*	241-346	Imazapyr	3 pints/acre every 3rd year OR 2 pints/acre every other year

Arsenal Railroad Herbicide *American Cyanamid*	241-273	Imazapyr	3 pints/acre every 3rd year OR 2 pints/acre every other year
Garlon 4 *Dow AgroSciences*	62719-40	Triclopyr, butoxyethyl ester	The lowest of the following rates: Lowest Labeled Rate or 0.5 pints per acre within 10 feet; Lowest labeled rate or 3.0 pints within 50 feet

Disclaimer: The Massachusetts Department of Food & Agriculture makes no endorsement of any companies, organizations, persons, products, trade or brand names referenced in this Rights of Way Sensitive Area Materials List ("the list"). Active Ingredients on the list are reviewed pursuant to a Cooperative Agreement between The Massachusetts Department of Food and Agriculture and The Massachusetts Department of Environmental Protection. Only environmental fate and toxicological data, including eco-toxicological data, are reviewed when evaluating an active ingredient's suitability for inclusion on the list. Inclusion on the list does not represent any endorsement by the Massachusetts Department of Food & Agriculture or the Massachusetts Department of Environmental Protection as to the efficacy of the active ingredient for rights-of-way vegetation management.

APPENDIX 4

NSTAR's ROW Location Map



NSTAR ELECTRIC

NSTAR Electric and Gas Corporation
Transmission System

5 0 5 10 Miles

APPENDIX 5

Listing Of Municipalities In Which

NSTAR Facilities Are Located

Abington- Transmission
Acton- Electric/Gas
Acushnet- Electric/Gas
Arlington- Electric
Aquinnah - Electric
Ashland- Electric/Gas
Assonet- Electric/Gas
Auburn- Gas
Avon- Transmission
Barnstable- Electric
Bedford- Electric
Bellingham- Electric
Belmont- Gas
Berlin- Gas
Blackstone- Transmission
Bolton- Gas
Boston- Electric
Bourne- Electric
Boylston- Gas
Braintree- Transmission
Brewster- Electric
Bridgewater- Transmission
Brockton- Transmission
Brookline- Electric
Burlington- Electric
Cambridge- Electric/Gas
Canton- Electric
Carlisle- Electric
Carver- Electric/Gas
Chatham- Electric
Chelsea- Electric
Chilmark- Electric
Dartmouth- Electric/Gas
Dedham- Electric/Gas
Dennis- Electric
Dover- Electric/Gas
Duxbury- Electric
East Bridgewater- Trans
Eastham- Electric
Edgartown- Electric
Fairhaven- Electric/Gas
Fall River- Transmission
Falmouth- Electric
Framingham- Electric/Gas
Franklin- Transmission
Freetown- Electric/Gas
Grafton- Gas
Halifax- Transmission
Hanson- Transmission
Harwich- Electric
Holbrook- Transmission
Holden- Gas
Holliston- Electric/Gas
Hopedale- Gas
Hopkinton- Electric/Gas
Hudson- Gas
Hyannis- Electric
Hyde Park- Electric/Gas
Kingston- Electric/Gas
Lakeville- Electric
Leicester- Gas
Lexington- Electric
Lincoln Electric
Marion- Electric/Gas
Marlborough- Gas
Marshfield- Electric
Martha's Vineyard- Electric
Mashpee- Electric
Mattapoisett- Electric/Gas
Maynard- Electric/Gas
Medfield- Electric
Medway- Electric
Mendon- Gas
Middleborough- Electric
Milford- Gas
Millbury- Gas
Millis- Electric
Millville- Gas
Milton- Electric/Gas
Natick- Electric/Gas
Needham- Electric/Gas
New Bedford- Electric/Gas
Newton- Electric
Norfolk- Electric
Northborough- Gas
Northbridge- Gas
Oak Bluffs- Electric
Orleans- Electric
Pembroke- Electric
Plymouth- Electric/Gas
Plympton- Electric
Provincetown- Electric
Randolph- Transmission
Rochester- Electric/Gas
Sandwich- Electric
Scituate (Humarock)- Electric
Sharon- Electric
Sherborn- Electric/Gas
Shrewsbury- Gas
Somerville- Electric/Gas
Southborough- Gas
Stoneham- Electric
Stoughton- Transmission
Stow- Gas
Sudbury- Electric
Sutton- Gas
Tisbury- Electric
Truro- Electric
Upton- Gas
Uxbridge- Gas
Walpole- Electric
Waltham- Electric
Wareham- Electric
Watertown- Electric
Wayland- Electric/Gas
Wellfleet- Electric
Westborough- Gas
West Boylston- Gas
Weston- Electric
Westport- Electric
West Tisbury- Electric
Westwood- Electric/Gas
Whitman- Transmission
Wilmington- Transmission
Winchester- Electric
Woburn- Electric
Worcester- Gas
Yarmouth- Electric

APPENDIX 6

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APPENDIX 7

Vegetation Control Strategies in Sensitive Areas

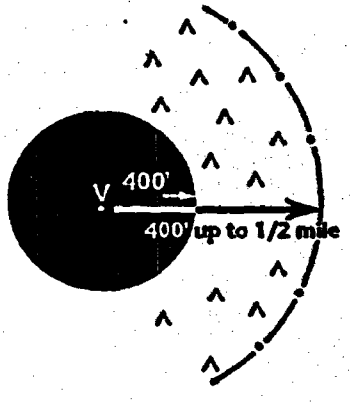
VEGETATION CONTROL STRATEGIES IN SENSITIVE AREAS

As required by 333 CMR 11.00 and/or approved VMP and YOP

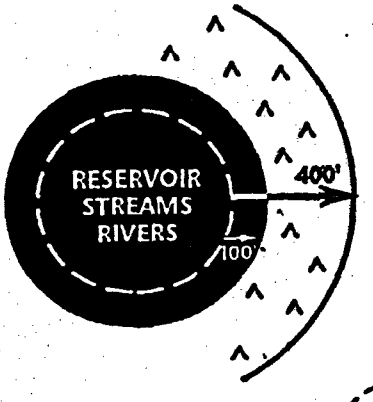
SENSITIVE AREAS NOT READILY IDENTIFIED IN THE FIELD

- Forester maps on USGS Topographic Maps
- Transfer to "T" Sheets
- Private wells identified in the field will be mapped on "T" Sheets and USGS topographic maps.
- Contractor will be provided both sets of maps with which to flag the boundaries of no-herbicide zones within the R.O.W. prior to herbicide application.

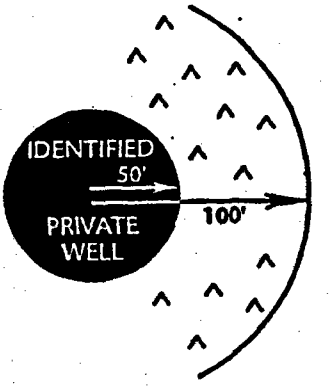
Public Ground Water Supply Well



Public Surface Water Supply



Identified Private Drinking Water Well



Public Ground Water Supply Well

Public Surface Water Supply

Primary Recharge Area (may not be known or mapped)

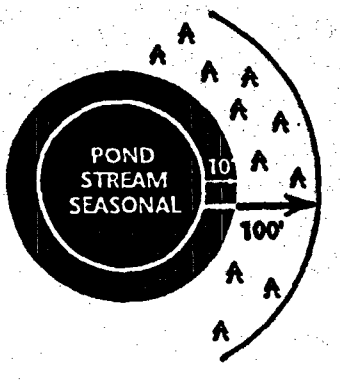
Private Well

SENSITIVE AREAS READILY IDENTIFIABLE IN THE FIELD

- Consult USGS Topographic Maps and "T" Sheets.
- Contractor will be provided both sets of maps with which to flag the boundaries of the no-herbicide zones prior to herbicide application.
- Contractor will mark additional areas not found on maps

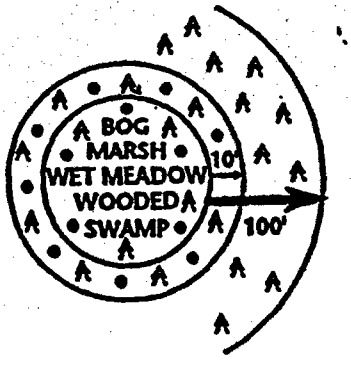
SURFACE WATERS

Non Water Supply



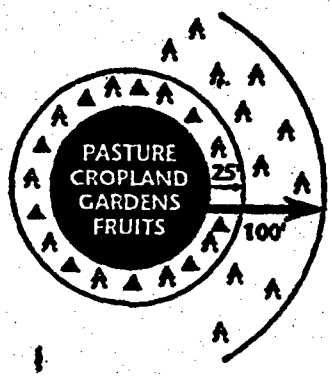
WETLANDS

Defined by C. 131 S. 40
(Except in areas subject to flooding)

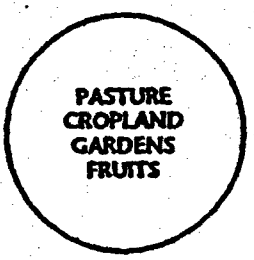


AGRICULTURAL AREAS

Active - Growing Season



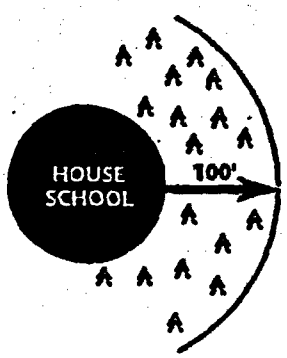
Inactive



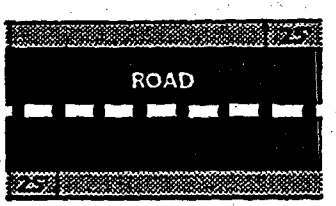
NO RESTRICTIONS

INHABITED AREAS

(People live, work, or gather)



ROAD CROSSINGS



KEY

No Herbicides

Conditional Herbicide Use

1) Herbicide recommended for use in sensitive area (333 CMR 11.04(1)(d)).

2) Cut stump, basal and low pressure foliar.

3) ^ 24 months elapsed since previous treatment.
   ^ 12 months elapsed since previous treatment.

4) ● No herbicides applied to conifer species and carriers reviewed by DFA and DEP.

5) ▲ Cut stump only.

Cut stump and basal treatments. No other conditions.

Section II

NSTAR's Yearly Operational Plan for 2006

NSTAR Electric & Gas Corporation

2006 Yearly Operational Plan

Rights-Of-Ways 143, 144, 243, 244, 340, 342, 345, 381, 5, 8-2, 8-3 and 16

In the Towns of Acushnet, New Bedford, Dartmouth, Marshfield, Duxbury, Kingston, Bourne, Falmouth, Sandwich, Barnstable, Mashpee, Winchester, Woburn, Burlington, Sudbury, Wayland, Weston, Waltham, Lexington, Burlington, Whitman, E. Bridgewater, Hanson, Halifax, Plympton, Kingston, and Plymouth.

NSTAR ELECTRIC & GAS CORPORATION
2004 Yearly Operational Plan (YOP)

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NSTAR ELECTRIC & GAS CORPORATION
2006 Yearly Operational Plan (YOP)

I. INTRODUCTION

In compliance with the Commonwealth of Massachusetts' Rights-of-Way Vegetation Management Regulation, 333 CMR 11.00, (Appendix A) NSTAR's Yearly Operational Plan (YOP) details our vegetation management program for 2006. This YOP is consistent with the terms and procedures set forth in NSTAR's five-year Vegetation Management Plan (VMP) approved by the Massachusetts Department of Food and Agriculture (DFA) in 2004.

This YOP specifically addresses using herbicide treatment as one tool to manage NSTAR's ROW's 143, 144, 243, 244, 340, 342, 345, 381, 5, 8-2, 8-3 and 16. These ROW's are located in the following areas; Acushnet, New Bedford, Dartmouth, Marshfield, Duxbury, Kingston, Bourne, Sandwich, Barnstable, Falmouth, Mashpee, Winchester, Woburn, Burlington, Sudbury, Wayland, Weston, Waltham, Lexington, Whitman, E. Bridgewater, Hanson, Halifax, Plympton, Kingston, and Plymouth for the year 2006.

Public Notice, Review and Comment

Upon submittal of the YOP for approval, the Department of Food and Agriculture (the Department) will publish a notice in the Environmental Monitor. Said notice shall be provided by the applicant and shall include the information on the municipalities through which the rights-of-way pass, a brief description of the intended program, and the procedure for public review and comment. The Department will distribute copies of the Environmental Monitor notice to the appropriate mailing list and NSTAR. (333 CMR 11.06 a)

NSTAR will provide by certified mail under separate cover to the Board of Health, Conservation Commission and chief elected municipal official a copy of the proposed YOP and the Environmental Monitor notice for the city or town in which the herbicide treatment is proposed. The applicant shall maintain copies of the packet sent to municipalities and certified mail receipts as part of the record keeping requirements, 333 CMR 10.15. (333 CMR 11.06 b)

The Department shall allow a 45 day comment period on proposed YOP, unless extended for good cause, commencing with the publication of the notice in the Environmental Monitor and receipt of the proposed YOP and Environmental Monitor notice by each municipality. (333 CMR 11.06 c)

The Department may approve, deny or modify YOP after the 45 day comment period has expired. (333 CMR 11.06 d)

Public Notification

NSTAR will provide by certified mail under separate cover, at least 21 days in advance of the application of herbicide to the right-of-way, a notice to the Department and to the Mayor, City Manager or Chairman of the Board of Selectman, the Board of Health, and the Conservation Commission in the municipality where the right-of-way lies. The notice shall include but not be limited to the approximate date on which such spraying shall occur, provided however, that said spraying shall not conclude more than ten days after said approximate date; a copy of a DFA approved Herbicide Fact Sheet on the active ingredient(s) of the herbicide(s) used; the name and address of contractor who will make the application.

This notice may run concurrently with the public notice and comment period in 333 CMR 11.06(3) provided the application is made after the close of the public notice and comment period and all modifications to the YOP are made before the application takes place and approval is granted by the Department. (333 CMR 11.07)

II. Location of Intended Herbicide Treatment

Herbicide treatments in 2006 are scheduled on Rights-of-Way (ROW) 143, 144, 243, 244, 340, 342, 345, 381, 5, 8-2, 8-3, and 16. These are located in the following areas; Acushnet, New Bedford, Dartmouth, Marshfield, Duxbury, Kingston, Bourne, Sandwich, Falmouth, Mashpee, Barnstable, Winchester, Woburn, Burlington, Sudbury, Wayland, Weston, Waltham, Lexington, Whitman, E. Bridgewater, Hanson, Halifax, Plympton, Kingston, and Plymouth. Maps of these ROW's are attached.

III. Identification of Target Vegetation

Pursuant to the policy and intent set forth in NSTAR's VMP, all vegetation must be removed that obscures the ROW corridors and grows tall enough to interfere with the safe, efficient and legal operation of a power line. The primary target is woody vegetation that matures over 12 feet or impedes access to the ROW. Although, shrubs less than 12 feet in height are not usually targeted, dense woody vegetation is targeted that interferes with the inspection and maintenance of the poles and wires and access to the power line, especially during an emergency.

Herbaceous growth is always acceptable and encouraged. Shrubs less than 12 feet in height are not usually considered targets except within the immediate proximity of poles, access paths or roadways. These shrubs and herbaceous plants create an aesthetically pleasing and wildlife friendly environment that competes with undesirable tree species.

The primary *target vegetation* includes, but is not limited to:

Alder	Cherry	Pine
Aspen	Maple	Poison Ivy
Beech	Oak	Sumac
Birch	Spruce	

IV. Definition, Identification and Treatment of Sensitive Areas

Sensitive Areas are those areas within the ROW in which public health, environmental concerns or agricultural interests warrant special protection to minimize the risk of unreasonable adverse effects. Prior to any herbicide applications, all Sensitive Areas will be identified and appropriately marked on maps and flagged or marked in the field. They will also be marked for permanent record on ROW maps 143, 144, 243, 244, 340, 342, 345, 381, 5, 8-2, 8-3, and 16.

a. General Definition of Sensitive Areas per 333 CMR 11.02 (a-e)

Readily identifiable Sensitive Areas include but are not limited to the following:

1. Within one hundred (100) feet of any standing or flowing water
2. Within one hundred (100) feet of any wetland
3. Within one hundred (100) feet of any inhabited or agricultural area

Sensitive Areas not readily identifiable in the field include but are not limited to the following:

1. Within the primary recharge area of a public drinking water supply well
2. Within four hundred (400) feet of any surface water used as a public water supply
3. Within one hundred (100) feet of any identified private drinking supply well.

b. Methods of Identifying Sensitive Areas

The following sources and methods aid in the identification of Sensitive Areas:

1. Massachusetts Department of Environmental Protection (DEP) water supply maps
2. Massachusetts Department of Food and Agriculture (DFA) G.I.S. maps and lists of identified private wells along the pipeline ROW
3. Correspondence and input from municipalities within the consecutive forty-five day YOP and twenty-one day Municipal ROW Notification Letter review and comment periods
4. A point person who precedes the treatment crew verifying identified Sensitive Areas and any additional areas that may require special precautions.

c. Definition and Treatment of Wetlands

Herbicide applications in wetlands will be performed in accordance with 333 CMR 11.04 (4)(c)(2) relative to ROW management.

According to these regulations:

1. Wetlands may be selectively treated with DFA recommended herbicides where target vegetation is present
2. No herbicides will be applied within ten (10) feet of standing or flowing water

d. Identification and Treatment of Private Drinking Water Supplies

In accordance with 333 CMR 11.04 (2)(c), maps and lists on file at DFA were reviewed in an attempt to *identify* private wells within one hundred (100) feet of the ROW's. No herbicide treatments will take place within fifty feet of these private wells.

DFA will be consulted again prior to treatment in an attempt to keep the private drinking water supply information up-to-date *and* municipalities are encouraged to assist in the identification process. Any identified private drinking supplies within one hundred (100) feet will then be marked in the field and permanently recorded on appropriate maps.

V. Proposed Herbicide Treatment Methods

Experienced, Massachusetts licensed applicators will perform the 2006 selective herbicide treatment on ROW 143, 144, 243, 244, 340, 342, 345, 381, 5, 8-2, 8-3, and 16 corridors under the direct on site supervision of a certified applicator. The herbicides will be applied on foot using selective low pressure foliage backpacks and cut stump treatments where applicable. These methods are described below.

Low Pressure Back Pack Foliar Treatment

Low pressure foliar treatments with hand pump backpack sprayers are used in low density target vegetation situations. The herbicide solution, which is commonly diluted to 3 -10% component of the total solution, is applied to wet the target plant. Motorized backpack application equipment is used in both low and high density vegetation this equipment generates a column of air which applies the solution, diluted as above, to lightly wet the target plant.

Foliar treatments are used within the cleared width of the ROW for tree and shrub target species below 12 ft. in height. Small seeded in conifers capable of growing into the conductors will be foliar treated. Foliar treatments are not used within visual buffers on targets greater than 6 ft. in height, within 100 ft. of a public water supply, within 50 ft. at the private water supply, within 10 ft. of standing surface water, or within 25 ft. of active crop plants gardens or pastures.

Foliar treatments are allowed in wetland areas where no standing water is present as per the Department of Food and agricultural decision, dated October, 1995, which considered the wetland impact study conducted pursuant to 333 CMR 11.04 (4) (C) (2) (appendix D)

Application foliar treatments is limited to the season when leaves are fully developed in the spring until early fall as leaves begin dropping off the trees approximately June 10 to October 09, 2004. When foliar treatments are used according to NSTAR's application program, they are an effective and efficient method to control the whole target plant. This control reduces competition from sprout vegetation and encourages shrub and herbaceous growth that further inhibits and slows the invasion of non compatible tree species. This creates and maintains a diverse vegetative cover that minimizes vegetation management needs while providing an attractive site for wildlife and multiple users of the ROW by minimizing the density of target vegetation. By lowering density of target species the maintenance cycle is lengthened which reduces impacts associated with periodic vegetation management operations.

VI. Proposed Herbicides, Carriers, Adjuvants and Rates

Only Commonwealth of Massachusetts recommended herbicides for use in Sensitive Areas—pursuant to 333 CMR 11.04 (1)(d)—will be used on the entire length of ROW 180 & 280's ROW corridor.

Table I: Tank Mix for Low Volume Foliage Application(s)

Herbicides & Adjuvants	Active Ingredient	Mix Concentration (per 100 gals. water)	Estimated Application Rate Per Acre
Krenite S	Ammonium salt of fosamine	6-8%	
Escort XP	Metsulfuron methyl	2oz	
Arsenal	Imazapyr	1/8%- ¼%	
Induce (surfactant)	Alkyl Aryl polyoxylkane ether	¼%	
38F (anti drift)	Polyacrylamide polymer	¼%	Total Mix = 3-15 gals/ac

VII. Alternative Control Techniques

Areas not to be treated or prohibited from herbicide use, such as protective buffers, will be maintained mechanically according to the specification in the VMP. Hand cutting with power saws is the most common technique; however, hydraulic operated mowers mounted on tractors may be used where terrain permits in situations of extremely dense target vegetation, especially if a significant poison ivy population is present in these areas.

VIII. The Companies that will perform the herbicide treatment are:

Vegetation Control Service, Inc.
2342 Main Street
Athol, MA 01331
(978) 249-5348

Asplundh Tree Expert Co
708 Blair Mill Rd.
Willow Grove, PA 19090
(800) 248-8733

Davey Tree Expert Co
1500 North Mantua St.
Kent, OH 44240
(800) 828-8312

Lucas Tree
636 Riverside St.
Portland, ME 04104
(888) 845-7870

Lewis Tree Service
225 Ballantyne Rd.
Rochester, NY 14623
(585) 436-3208

IX. The individual responsible for supervising the YOP is:

Christopher J. Fallon, Senior Arborist
NSTAR Electric & Gas Corporation
Vegetation Management Department
One NSTAR Way, SE-370
Westwood, MA 02090-9230
781-441-3837
339-987-7294

X. Herbicide Fact Sheets

Herbicide Fact Sheets, prepared and provided by DFA, that explain technical information relative to the herbicide concentrates proposed for use during the 2006 treatment cycle, are included in Appendix B, along with the manufacturer's labels in Appendix C.

XI. Procedures for handling, Mixing and Loading Herbicide Concentrates

All herbicides will be handled, mixed and applied according to strict *Label Instructions* and in compliance with all applicable federal and state laws and regulations. All herbicide mixing should be done at the contractor's facilities and extreme care will be exercised during all mixing, handling and loading in order to prevent careless spills or splashes. No herbicide concentrates will be mixed, handled or loaded on a ROW within one hundred (100) feet of a Sensitive Area.

XII. Emergency Resources

NSTAR contracts with independent, professional, certified herbicide applicators that are responsible for the containment, clean up and reporting of chemical spills or accidents. The following is, therefore, only a guide to the information sources that ***must be*** available to the treatment crew in the event of a chemical spill or emergency situation:

A. Technical Reference Materials:
   a. Product Label
   b. Product Material Safety Data Sheet (MSDS)
   c. Product Fact Sheet, if available

B. Table III, Herbicide Manufacturers:

Manufacturer	Telephone Number	Special Instructions
BASF Corporation	800-832-4357	Arsenal product
E.I. du Pont de Nemours and Company	800-441-3637	Krenite & Escort products
Dow Agro Sciences	800-992-5994	Accord product
Helena Chemical Company	901-761-0050	Induce product
Sanag	323-245-6781	38F product

C. Table IV, State Agencies:

STATE AGENCY	TELEPHONE NUMBER	SPECIAL INSTRUCTIONS
Massachusetts Pesticide Bureau	617-626-1700	A.S.A.P. (within 48 hours)
Massachusetts Department of Environmental Protection, Division of Hazardous Waste	Main Office: 888-304-1133 617-292-5500 --- Southeast Region: 508-946-2700	for emergencies involving reportable quantities of hazardous materials
Massachusetts Dept of Public Health, Bureau of Env.Health Assessment Toxilogical Program	617-624-5757	
Massachusetts Poison Information Centers	800-682-9211	for medical emergencies involving suspected or known pesticide poisoning symptoms

D. Table V, Emergency Services:

EMERGENCY SERVICE	TELEPHONE NUMBER
Massachusetts State Police, Central Office	617-566-4500 or 911
ChemTrec	800-424-9300

NSTAR's contact in the case of a spill or accident is:

System Control
NSTAR Electric & Gas Corporation
One NSTAR Way
Westwood, MA 02090-9230
(617)-541-7858

E. Table VI, Local Emergency Numbers:

TOWN	POLICE, FIRE & AMBULANCE	BOARD OF HEALTH	TOWN HALL
Acushnet	911	508-998-0275	508-998-0200
Barnstable	911	508-862-4644	508-862-4602
Bourne	911	508-759-0615	508-759-0600
Burlington	911	781-270-1955	781-270-1600
Dartmouth	911	508-910-1804	508-910-1820
Duxbury	911	781-934-1105	781-934-1108
East Bridgewater	911	781-378-1612	781-378-1606
Falmouth	911	508-495-7485	508-495-7230
Halifax	911	781-293-6768	781-293-7970
Hanson	911	781-293-3138	781-293-2772
Kingston	911	781-585-0503	781-585-0500
Lexington	911	781-862-0500, x200	781-862-0500
Marshfield	911	781-834-5558	781-834-5563
Mashpee	911	508-539-1400, x555	508-539-1400
New Bedford	911	508-991-6273	508-991-6148
Plymouth	911	508-747-1620, x118	508-747-1620
Plympton	911	781-585-3220	781-585-7000
Sandwich	911	508-888-4200	508-888-5144
Sudbury	911	978-443-2209, x1379	978-443-8891, x351
Waltham	911	781-314-3305	781-314-3100
Wayland	911	508-358-3616	508-358-3631
Weston	911	781-893-7320, x332	781-893-7320, x303
Weymouth	911	781-340-5008	781-335-2000
Whitman	911	781-447-7616	781-447-7616
Winchester	911	781-721-7121	781-721-7130
Woburn	911	781-932-4407	781-932-8282

Appendix B

Chemical Fact Sheets

THE COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS
Department of Agricultural Resources
251 Causeway Street, Suite 500, Boston, MA 02114
617-626-1700 fax 617-626-1850 www.Mass.gov/DFA

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Governor

KERRY HEALEY
Lieutenant Governor

ELLEN ROY HERZFELDER
Secretary

DOUGLAS P. GILLESPIE
Commissioner

FOSAMINE AMMONIUM

Common Trade Name: Krenite, Krenite UT

Chemical Name: Ammonium ethyl carbamoylphosphate

CAS No.: 25954—13—6

GENERAL INFORMATION

Fosamine ammonium is usually applied to plants in the late summer and early fall. It is systemically absorbed by buds, stems and foliage. In most plants, effects of herbicide treatment are not evident until the following spring when buds fail to develop, or develop into miniature spindly leaves that do not provide adequate photosynthesis. The plant consequently dies. Although it is translocated within plants, effective treatment requires the complete coverage of all parts of woody plants. In some species of non-deciduous plants, such as pines and bindweed, leaves may turn brown immediately after application.

ENVIRONMENTAL FATE

Mobility

Fosamine ammonium is a low mobility herbicide and is not readily leached from soil. Soil adsorption coefficients (Kd) for Fosamine ammonium are reported as ranging from 0.22 (low organic sandy barns) to 350 (silt barns) (103). The organic matter adsorption coefficients are more variable and range from 20 to 62, with one adsorption coefficient reported at 7400 (103). There does not appear to be a good correlation between the soil adsorption coefficents and organic matter, clay or silt content of the soil.

In a study using soil thin layer plates to assess mobility, the Rf values (ratio of the compound mobility versus the leading edge of the water movement) for Fosamine ammonium ranged from 0.92 to 0.98 on the four soils tested (103). These Rf values indicate a high mobility pesticide, in contrast to the soil adsorption coefficients and leaching studies which indicate low mobility. This information may reflect the solubility of fosamine ammonium and not its mobility characteristics.

Fosamine ammonium is strongly adsorbed to soil particles and it is not carried away in precipitation, in spite of its high water solubility. In a laboratory study using inclined soil flats (Fallingston sandy loam), Fosamine ammonium was applied at the rate of 15 lbs a.i/acre followed by simulated rainfall. The Fosamine ammonium remained near the surface of the soil and in the upper part of the flat, thus indicating no appreciable downward or lateral mobility (105). Field studies conducted in Florida, Delaware and Illinois have confirmed the laboratory results and indicate very little or no downward movement in soil of the herbicide or its degradation products (15, 104, 105).

Field studies indicate that Fosamine ammonium has low vertical mobility but, soils with higher adsorption capacities will tend to retard movement more than soil with lower adsorption capacities (15). However, Fosamine ammonium may move with the soil during erosion (14). Due to strong adsorption of fosamine ammonium to soil particles, there is little tendency for ground water contamination or for surface waters to become contaminated without direct application of the material (14, 15).

In the field studies, the Delaware soil (Keyport silt loam) was the most representative soil of Massachusetts conditions. However, the Fallsington sandy loam which was used in the greenhouse studies represents a close approximation to Massachusetts soils. In these studies Fosamine ammonium exhibited slight tendency to leach in both those soils. Consequently, it is expected that fosamine ammonium will exhibit slight leaching in Massachusetts soils.

Persistence

The major route of Fosamine ammonium degradation is metabolism by soil microorganisms. Fosamine ammonium is stable to degradation by hydrolysis at pH values 5, 7, and 9; it is also stable to photodegradation (10, 14, 101, 102).

Fosamine ammonium is not considered a persistent compound in soils. Under field conditions in Florida, Delaware and Illinois, the half-life of Fosamine ammonium in soils was approximately one week following the application of 10 lbs/acre (104).

In the field, the metabolite carbamoylphosphonic acid (CPA) was found several days after initial soil treatment. All Fosamine ammonium and CPA had disappeared completely by 3 to 6 months (14, 15).

Greenhouse soil studies indicate a half-life of about 10 days, which is in close agreement with the field study half—life (15,104). In the field, Fosamine ammonium was metabolized to CPA more quickly in fine sand than in two silt barns (14, 104).

There is little persistence information in the literature for Fosamine ammonium and the only reported field degradation rates are from one study. This might be a cause for concern were it not for the close agreement in soil half-lives reported, not withstanding the varied location and soils used in the field studies. Moreover, the greenhouse degradation study was also in close agreement with the reported field half-life.

It is assumed that the half-lives reported in the previous study have been obtained in spring to summer conditions, since they were not stated. The degradation of fosamine ammonium was investigated for a one year period in the previous study but, because of the short half-life complete degradation had occurred before the winter. It is expected that fosamine ammonium will be applied in summer or fall only since it must be applied to full foliage for control. Consequently, the lack of winter degradation rates is not a major concern.

With most herbicides soil characteristics and local climatic factors have a pronounced effect on soil half—life. This study suggest that degradation of Fosamine ammonium by soil microorganisms is not influenced by soil characteristics or local climate to any appreciable extent.

Due to the similar persistence of Fosamine ammonium in all locations and soils there is no most representative location. In this case, all sites represent expected persistence. Therefore, the half-life of Fosamine ammonium under Massachusetts condition is expected to be approximately one week.

TOXICITY REVIEW

Acute (Mammalian)

The oral LD5Os have been determined for both the formulated product and the formulated product plus surfactant (41.1 to 42% active ingredient (ai) in both cases). The LD5Os in the male rat were 24,400 mg (ai) (formulated product)/kg and 7,295 mg (ai) (formulated product with surfactant)/kg. Female rats had

an LD50 of 5,000 (ai) mg (formulated product with surfactant)/kg. The formulated product has an LD50 of 7,380 mg(ai)/kg (formulated product) in male guinea pigs (107).

Fosamine ammonium was tested in an acute dermal study. 10 ml of the formulated product at a dose of 1,683 mg(ai)/kg resulted in no mortalities and no clinical signs of toxicity (107). The formulation plus surfactant was tested in rabbits and was not a primary eye irritant. There was mild transient erythema in tested skin. No sensitization was found in Guinea pigs (107).

The formulation plus surfactant (0.1 ml) produced transient mild corneal opacity and transient conjunctual irritation. The formulation without the surfactant was not an irritant (107).

Metabolism

The metabolism of Fosamine ammonium in the rat is rapid with 86% in feces and 11% in urine after 48 hrs (103,15). Compounds identified in the feces included 14C radiolabelled fosamine ammonium (86%) and 14C Carbamoylphosphonic Acid (CPA) diammonium salt (14%). The compnunds identified in the urine were also fosamine ammonium and CPA (103).

Subchronic and chronic feeding studies have been performed using several species, for various time periods.

The No Observable Effect Level (NOEL) for Fosamine Ammonium in diet studies for rats (90 day), dog (6 month), and sheep (90 day) were: 5,000/10,000 ppm, (286/572 mg/kg); 1,000 ppm (40 mg/kg) and 2,000/2,500 ppm highest dose tested (HDT) respectively (107). In the feeding studies the dose was increased after a certain time point when effects were not observed at the lower dose. These dose groups are written first dose/increased dose. In the six month dog study, the female dogs receiving 5000/7500/10000 ppm had increased stomach weights (107).

Oncogenicity Studies

Long term carcinogenicity studies are not available. These studies have not been required by EPA as there are no food uses proposed for Krenite.

Mutagenicity Studies

Mutagenicity testing has been done using Fosamine Ammonium formulated product. It was negative in 5 strains of the Ames assay, and negative both with and without activation in Chinese Hamster ovary point mutation assay. Chromosome damage was produced in the in vitro cytogenetic assay using Chinese Hamster ovary cells at 1.6% and 3.2 formulation (nonactivated) and 1.4, 2.8 and 5.7% formulation (activated) (107). There were no compound related increases in chromosomal aberrations in an in vivo bone marrow study and no changes in unscheduled DNA synthesis in rat hepatocytes (107).

Developmental Studies

The developmental studies that have been performed using fosamine ammonium include a one generation/two litter rat study and a rat oral teratogenicity study. The doses in the 90 day reproduction study were 0, 200, 1,000 and 5,000/10,000 ppm (0, 11, 57 and 285/570 mg/kg/d). There were no effects observed on reproduction and lactation in the reproduction study (NOEL = 5,000/10,000 ppm HOT). The doses in the teratogenicity study were 0, 200, 1,000 and 5,000/10,000 ppm (0, 11, 57 and 285/570 mg/kg/d). There were no effects observed on teratogenicity and fetoxicity at the 1,000 ppm dose level(107).

(a) In these discussions the assumptions made for conversion of ppm (diet) to mg/kg/D were:

Species	Body weight (kg)	Intake (kg)
Rat	0.35	0.020
Mouse	0.03	0.004
Dog	10	0.4

Avian

Unformulated Fosamine ammonium was administered to Mallard ducks and bobwhite quail by intubation in acute toxicity studies. Five birds per species-sex group received doses of 0, 312.5, 625, 1,250, 2,500, and 5,000 mg/kg. The LD50 was greater than 5,000 mg/kg in both the ducks and quail (15, 107).

Ducks and quail were also used in subacute dietary studies at doses of 0, 625, 1,250, 2,500, 5,000 and 10,000 ppm in the diet for 5 days. Basal diet was given for the last three days of the 8 day exposure. The 8 day LC50 in the diet was greater than 10,000 ppm. There was no increase in duck mortality: food consumption was depressed but body weight gain was normal. There was variable quail mortality and food consumption and body weight were decreased as compared with control (15, 107).

Invertebrates:

Fosamine ammonium toxicity has been determined for only a very few microorganisms and invertebrates. The available studies indicate that Fosamine ammonium has a very low acute toxicity to those organisms tested (15):

Fosamine ammonium salt (42% formulation): 48 hr LC5Os range from 1,524 mg/L for Daphnia to 10,000 mg/L for bees sprayed with the herbicide.

Aquatic Species (fish):

Fosamine ammonium has a very low toxicity to those fish species tested.

Fosamine ammonium salt (42% formulation): 96 hr LC5Os range from 670 mg/L for bluegill sunfish to 8,290 mg/L for coho salmon (15).

Except for the LC5O of 670 mg/L for the bluegill sunfish, reported adult fish LC5Os are all in excess of 1000 mg/L. (15) The yolk-sac fry stage in salmonids was the most sensitive to Fosamine ammonium.

Threshold-effect concentrations of Krenite for salmonids in partial life-cycle studies are less than 75 times the maximum theoretical concentration of Krenite that would be found in shallow waters due to direct overhead spray application (15).

SUMMARY

Fosamine ammonium is not persistent in the environment and is a low mobility herbicide in soil. Fosamine ammonium has a low potential to leach to groundwater or to reach surface waters from surface runoff. With acute oral LD5Os in rats of greater than 5,000 mg/kg, Fosamine ammonium is considered to be of low acute and subchronic mammalian toxicity. Subchronic exposures to Fosamine ammonium resulted in NOELS of greater than 1,000 ppm in a 6 month dog study. Mutagenicity test were negative in all but one case and there are no carcinogenicity data for this active ingredient. Fosamine ammonium is also considered to have very low aquatic and invertebrate acute toxicity.

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Secretary

DOUGLAS P. GILLESPIE
Commissioner

METSULFURON METHYL

Common Trade Names: Escort, Escort XP (2)

Chemical Name: Methyl 2 E[C[(4-Methoxy—6-methyl-l,3,5-Triazifl—2-yl) aminolcarbonyl] amino] sulfonyl.]benzoate] (9)

CAS NO.: 74223-64-6

GENERAL INFORMATION

Metsulfuron methyl is a sulfonyl urea herbicide initially registered by E.I. DuPont in 1986. It is a foliar herbicide registered for use on wheat and barley and non-cropland sites such as Right of Way (9).

ENVIRONMENTAL FATE

Mobility

Metsulfuron methyl is a relatively new herbicide. The studies reviewed here have been provided by the registrant, EI DuPont.

The soil water partition coefficients (Kd) of Metsulfuron Methyl have been determined in four different soils: Cecil sand, Flanagan silt loam, Fallsington silt loam, and keyport silt loam. The Kd values range from 0.36 for Cecil sand to 1.40 for Flanagan silt loam, and Kom values ranged from 29 for Fallsington silt loam to 120 for Cecil sand (100). The values for Kd and Kom indicate that metsulfuron methyl is not adsorbed well to soil and that the organic content of the soil is not the only adsorption component. The silt and clay contents appear to influence adsorption, but there are probably other factors also involved.

The previous study also determined the Rf values for soil. Thin layer chromatography was performed on four soils for metsulfuron methyl. The Rf values ranged from 0.64 to 1.00; only one value was less than 0.90 (100). This result confirms the validity of the Kd values, indicating that metsulfuron methyl is mobiie and that the organic matter content of the Soil is a significant component of adsorption.

Metsulfuron methyl was applied to tops of 12 inch columns [containing four different soils], and eluted with 20 inches of water in 20 hours. Following the percolation of the total volume of water, 106% of the metsulfuron methyl was eluted from the Fallsington sandy loam, 96% from the Flanagan silt loam, 81% for Keyport silt loam and 93% for Myakka sand (100). The breakthrough volumes for the Fallsington, Flangan, Keyport and Myakka soils were 6.5, 4.5, 6.9 and 5.8 inches of water respectively (101).

Metsulfuron methyl is relatively mobile in most soils, but will be retained longer in soils with higher percentages of organic matter.

Persistence

There are two studies which have reviewed the persistence of metsulfuron methyl in the soil. One study was conducted in the southern United States and the second was in the northern United States and Canada. The results of the studies indicate a somewhat contradictory picture of the persistence of metsulfuron methyl.

The soil half-lives in Delaware, North Carolina, Mississippi and Florida were 1 week, 4 weeks, 3 weeks and 1 week respectively following an application in mid to late summer (102). The results are varied and indicate that either climatic or soil factors determine the persistence. The climate is sufficiently similar to be able to discount that as a factor. However, both of the locations where the shortest half-lives were observed had the highest organic matter content in the soils. Furthermore, the half—lives correspond with the organic matter content.

The half—lives following spring applications were 4 and 56 weeks for two sites in Colorado, 6 weeks in North Dakota and 28 weeks in Idaho (103). In contrast to the southern United States study there does not appear to be any correlation with climatic or soil characteristics. There appears to be a slightly shorter half—life in acidic soils in the same location.

Metsulfuron methyl was also applied in the fall and the half-lives determined in two sites in Colorado, North Dakota and Idaho. These half—lives were 8 weeks, 12 weeks, 42 weeks and 28 weeks respectively. As was expected there were longer half—lives following fall applications in North Dakota (6 weeks vs. 42 weeks) however, in Idaho there was no change at all, which is unexpected.

In Canada following spring applications the reported half-lives were 10 weeks, 4 weeks, 4 weeks and 6 weeks for Alberta, 2 locations in Saskatchewan and Manitoba (103). One would expect longer half lives in Northern locations due to the effects of temperature on degradation rates. The results from Canada are generally shorter than those in the U.S. locations, which is unexpected.

Therefore, the half-life of Metsulfuron methyl in the soil is variable and dependent on the location. It is shorter when applied in the spring but appears independent of other environmental factors in most locations.

TOXICITY REVIEW

Acute (Mammalian)

The toxicology database for Metsulfuron methyl has been reviewed and accepted by the EPA (9). DuPont supplied excerpts from their monograph on Ally herbicide (112). Summaries of studies were supplied by DuPont for subchronic, chronic and reproductive studies.

Technical metsulfuron methyl has been tested in two acute oral LD50 studies in Crl:CD Rats. In the first study the LD5O was greater than 5,000 mg/kg and in the second it was greater than 25,000 mg/kg (the maximum feasible dose) (112). Clinical signs included salivation, chromodacryorrhea, stained face, stained perineal area and weight loss (112).

In a 10—dose subacute study using male rats, a single repeated dose of 3,400 mg/kg/day for 10 days over a 2 week period was administered. This was followed by a two week recovery period. No deaths occurred and slight weight loss was the only clinical sign observed. In addition, no gross or microscopic changes were observed (112). The dermal LD50 is greater than 2,000 mg/kg in male and female rabbits (112). Technical metsulfuron methyl caused mild erythema as a 40% solution in guinea pigs. There was no reaction observed at the 4% concentration. No response occurred when treated animals were challenged (112).

In rabbits, moderate areas of slight corneal clouding and severe to moderate conjunctivitis were observed in both washed and unwashed eyes following treatment with technical metsulfuron methyl. The unwashed eyes were normal in 3 days and the washed eyes in 14 days (112).

Metabolism

Elimination of metsulfuron methyl in the rat is rapid, with 91% of a radioactive dose excreted over 96 hours (9). The routes of elimination were not specified within the report.

Subchronic/Chronic (Mammalian)
Ninety day feeding studies have been done with metsulfuron methyl in rats and mice. The rat study was done in conjunction with a one generation reproduction study (see Developmental Study Section). In this study rats received 0, 100, 1000, or 7500 ppm (0, 5.7, 57, 428 mg/kg/d) (a) in their diets. Effects observed at the high dose were: a decrease in body weight and an increase in total serum protein in the females, and a decrease in liver weight and a decrease in cytoplasmic clearing of hepatocytes in the males the NOEL in this study was 1000 ppm (104).

The 90 day mouse study was done in conjunction with the 18 month mouse study. Groups of 90 mice per sex per dose received 0, 5, 25, 500, 2500 or 5000 ppm (0, 0.66, 3.3, 66.6, 333.3, 666.6 mg/kg/d) in their diets. Clinical evaluations were made at 1, 2, 3, 6, 12 and 18 months. Ten animals per group were sacrificed at the 90 day time point for pathological evaluation. The 2500 ppm group was sacrificed at 12 months. Sporadic effects were observed on the body weight, food consumption, and organ weights. These were not dose related, resulting in a NOEL of 5000 ppm in diet for mice (111).

In the twenty-one day dermal rabbit study, the intact skin of male and female New Zealand White Rabbits received doses of 0, 125, 500 and 2,000 mg/kg for 6 hrs/day for 21 days. Clinical signs observed were sporadic weight loss and diarrhea in a few rabbits. These effects were not dose related. Non dose related histological effects were observed in male rabbits. This effect was characterized as mild testicular atrophy occurring sporadically at all doses (112, 108).

Feeding studies in dogs have been done with purebred beagles. The animals received metsulfuron methyl in diets at dose levels of 0, 50, 500 and 5000 ppm (0, 0.2, 2, 20 mg/kg/d) for one year. There was a decrease in food consumption in the high dose males. There was a decrease in serum lactate dehydrogenase in all groups of both sexes at two or more doses these values were within the historical controls. The NOEL was 500 ppm in the males and 5000 ppm in females (112).

In a chronic feeding study in rats, the animals received metsulfuron methyl at doses of 0, 5, 25, 500, 2500 or 5000 ppm (0, 0.28, 1.4, 28.6, 143 or 286 mg/kg/d. Interim sacrifices were done at 13 and 52 weeks (105).

At the 13 week sacrifice there was a decrease in body weight in the 2500 and 5000 ppm groups; there was a decrease in absolute liver weight at 2500 and 5000 ppm males. There was a decrease in the relative liver weights in the 2500 and 5000 ppm females.

(a) In these discussions the assumptions made for estimated conversion of ppm (diet) to mg/kg/D were:

Species	Body weight (kg)	Intake (kg)
Rat	0.35	0.020
Mouse	0.03	0.004
Dog	10	0.4

When data were presented as ppm, the dose was estimated in mg/kg and is presented in parenthesis.

Findings at the 52 week sacrifice included increase in kidney weight (2500 ppm males) and increased absolute brain weights (at doses of 25, 500, 2500 and 5000 ppm) in males and at doses of 2,500 and 5000 ppm in females. There was an increase in absolute heart weight at 2500 ppm in males and at 2500 and 5000 ppm in females. The absolute organ weights were back to normal at termination. Relative brain weights of the 2500 and 5000 ppm groups were increased (105)

Oncogenicity Studies
There were no gross or histopathological changes observed in mice receiving up to 5000 ppm metsulfuron methyl in their diets (112. 111). Similar results were obtained in the 104 week rat study; there were no histopathological changes observed which were attributable to metsulfuron methyl (105, 112). EPA concludes that there were no oncogenic effects in rats or mice at the highest dose tested; 5000 ppm in both cases (9).

Mutagenicity Testing
Metsulfuron methyl was negative in the unscheduled DNA synthesis assay; in vivo bone marrow

cytogenic assay in rats (doses were 500, 1,000, and 5,000 mglkg bw); CHO/HGPRT Assay; Salmonella typhimurium reverse mutation assay four strains with and without S9 metabolic activation; and also in the in vivo mouse micronucleus assay at doses of 166, 500, 1666, 3000 and 5000 mg/kg (112). 'T¶e only positive mutagenicity assay was in the in vitro assay for chromosome aberrations in Chinese Hamster Ovary at high doses (greater than 2.63 mM, 1.0 mg/mL)). In this assay no increases in structural aberrations were observed at 0.13 or 1.32 mM(0.05 or 0.5 mg/mL) (112).

Developmental Studies
Several studies have been done to investigate the effects of Metsulfuron methyl on reproduction and development in rats and rabbits.

Pregnant Crl: COBS CD(SD) BR rats received metsulfuron methyl at doses of 0, 40, 250 or 1000 mg/kg by the oral route on days 5 to 14 of gestation. There were 25 rats per group. Maternal toxicity was observed at doses of 250 and 1000 mg/kg/d. The maternal toxicity NOEL was 40 mg/kg/d. There was no evidence of "teratogenic" response or embryo fetal toxicity (112).

In the rabbit study, New Zealand white rabbits received 0, 25, 100, 300 or 700 mg/kg/d on days 6 to 18 gestation. There was a dose related increase in maternal deaths; 1, 2 and 12 deaths at doses of 100, 300 and 700 mg/kg respectively. The maternal toxicity NOEL was 25 mg/kg/d and there was no evidence of teratogenic or embryolethal effects observed in this study (112).

Several multigenerational studies have been done with Metsulfuron methyl. A four litter reproduction study was done concurrently with the chronic bioassay. Rats from each treatment were separated from the main study and bred. The doses were 0, 5, 25, 500, 2500, and 5000 ppm (0, 0.28, 1.4, 28.6, 143 and 286 mg/kg/d). There was a dose dependent decrease in body weight in the parental (P1) generation at doses of 25 ppm and greater in males and females. This effect was not present in dams during gestation or lactation (106).

Overall fertility in the P1 and filial (Fl) matings was low in both control and treated groups with no apparent cause. There was a decrease in pup size in the Fla but not the Flb, F2a, or F2b litters. The gestation index was 100% for all groups in both filial generations with the exception of F2a when it was 90%. On the basis of the lower body weights and lower growth rates, the NOEL was 25 ppm for this study (106).

In a 90 day, 2 generation 4 litter protocol, rats received 0, 25, 500 or 5000 ppm (0, 1.4, 28.6, 286 mg/kg/d) Metsulfuron methyl in their diets for 90 days prior to mating. In this protocol the parental generation was bred twice first to produce the Fla and then the FiB. The FiB rats were then fed the appropridte diet for 90 days (after weaning). There was a decrease in litter size in the 5000 ppm group in the F2a generation, but not in any other generation. The NOEL for this study was 500 ppm (107).

In a 90 day feeding, one generation rat study, 16 male and 16 female rats received 0, 100, 1000 or 7500 ppm in their diet prior to mating. There were no differences observed in reproduction and lactation performance or litter survival among groups. There was an overall low fertility in the control and treated groups. This result made the effects of metsulfuron methyl on fertility difficult to assess from this study (104).

Tolerances and Guidelines
Tolerances have been set for metsulfuron methyl in barley wheat (from 0.05 to 20 ppm, depending on the commodity) and in meat and meat byproducts (0.1 ppm). The tolerance in milk is 0.05 ppm (8, 9). The acceptable daily intake is 0.0125 mg/kg/d based on a one year dog NOEL of 1.25 mg/kg/d using a safety factor of 100 (9).

Avian
Metsulfuron methyl has been tested in two species of birds, the mallard duck and the bobwhite quail. The acute oral LD5O is greater than 2150 mg/kg in the duck. Two, 8 day dietary studies have been done. The 8 day LC5O is greater than 5620 ppm in both the duck and the quail (9).

Invertebrates

The 48 hour LC5O for Daphnia is greater than 150 ppm and the acute toxicity in the honeybee is greater than 25 mg/bee (9).

Aquatic

Metsulfuron methyl has acute LC5O of greater than 150 ppm in both the rainbow trout and the bluegill sunfish (9).

Summary

Metsulfuron methyl has a moderate to high mobility in the soil profile and is relatively persistent in the environment, especially when applied in the fall. These factors would be of concern under most circumstances. However, metsulfuron methyl is applied at very low rates (3-4 ozs./A) and therefore the amounts which reach the soil are quite low. Consequently, Metsulfuron methyl should not impact groundwater as a result of leaching or migrate from the target area. Metsulfuron methyl has low toxicity (EPA Toxicity Category III) for acute dermal exposure and primary eye irritation and is category IV for all other acute exposures. The chronic studies indicate no oncogenicity response and the systemic NOEL's are 500 ppm in rats and 5000 ppm in mice. There was no evidence of teratological effects in the rat or the rabbit at the highest dose tested in both species. While there was evidence of maternal toxicity at 40 mg/kg/d in the rat and 100 mg/kg/d in the rabbits.

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Commissioner

IMAZAPYR

Common Trade Name(s): Arsenal

Chemical Name: Imazapyr!
2-(4-isopropyl-4-methyl--5-oxy-2-imidazolin-2-yl)
nicotinic acid with isopropyl amine (2)

CAS No.: 81510-83-0

GENERAL INFORMATION

Imazapyr is effective against and provides residual control of a wide variety of annual and perennial weeds, deciduous trees, vines and brambles in non—cropland situations. It also provides residual control and may be applied either pre or postemergence. Postemergence is the preferred method especially for the control of perennial species. Imazapyr is readily absorbed by the foliage and from soil by the root systems. Imazapyr kills plants by inhibiting the production of an enzyme, required in the biosynthesis of certain amino acids, which is unique to plants (10, 100).

ENVIRONMENTAL FATE

Mobility

There are few studies which have investigated the mobility of Imazapyr in soil, but available reports indicate that Imazapyr does not leach and is strongly absorbed to soil (100). Imazapyr has a high water solubility (1 — 1.5%) which could generally indicate a high leaching potential, but as with other organic acids Imazapyr is much less mobile than would normally be expected (100). No soil partition coefficients have been reported, but they may be expected to be quite high (100).

One field study investigated Imazapyr mobility in a sandy loam soil (0.9% organic matter, 8.0% clay; 38.8% silt). Imazapyr did not leach below the 18—21 inch layer after 634 days and 49.6 inches of rain. The levels found below the 12 inch layer were just above the 5 ppb detection limit. In addition, this study investigated the off—target mobility of Imazapyr and found no residues further than 3 inches from the sprayed area after 1 year (102).

Although low levels of Imazapyr did move to the 18 to 21 inch layer this was only after nearly 2 years and fifty inches of rain. This indicates that imazapyr is relatively non-mobile and does not leach through the soil profile. Imazapyr remains near the soil surface and heavy precipitation may cause some off target movement from surface erosion of treated soils.

Persistence

The main route of Imazapyr degradation is photolysis. In a study of photodegradation in water, the half—life of Imazapyr was calculated as 3.7, 5.3 and 2.5 days in distilled water, pH 5 and pH 9 buffers respectively (101). A soil photolysis study for Arsenal on sandy loam calculated a half—life of 149 days (101).

Studies have investigated the persistence of Imazapyr in soil under aerobic and anaerobic conditions. The half-life of Imazapyr in soil has been reported as varying from 3 months to 2 years (100). A laboratory study found the half-life to be 17 months (101). Detectable residues were found in a field study in all soil layers to 21 inches at 634 days (102). Vegetation was sprayed with radio-labelled Imazapyr at a rate of 1 lb. a.i./acre. The soil was a sandy loam (0.9% organic matter) which received 49.6 inches of rain during 634 days. The highest level of radioactivity (0.234 ppm Imazapyr) was found in the top 3 inches of soil at 231 days after application and there were detectable levels in the 9-12 inch layer. The concentrations in the top layer increased steadily from day 4 to 231 when they reached their maximum (0.234 ppm) and then declined. At day 634 the level in the top layer (0-3 inch) was 0.104 ppm (102). These data indicate that Imazapyr is persistent in soil and, most importantly, that Imazapyr is translocated within plants from the plant shoots back to the roots and released back into soil. Very little of the Imazapyr actually reached the soil during application. The soil residues may be due to the decay of plant material containing Imazapyr in the soil (102).

TOXICITY REVIEW

Acute (Mammalian)

The acute oral LD5O in both male and female rats was greater than 5000 mg/kg using technical Imazapyr. The acute dermal LD5O in male and female rabbits was greater than 2000 mg/kg. The compound was irritating to the rabbit eye but recovery was noted 7 days after application of 100 mg of the test substance. It was classified as mildly irritating to the rabbit skin following application of 0.5 grams of the material on abraded or intact skin (103).

Arsenal product formulation was tested in a similar battery of tests. The rat oral LD5O value was greater than 5000 mg/kg and the rabbit dermal LD5O was greater than 2148 mg/kg. The irritation was observed following installation of 0.5 ml of the test substance in the skin study and 0.1 ml in the eye study (104).

Technical Imazapyr was administered to rats as an aerosol for four hours at a concentration of 5.1 mg/L. There were ten rats per sex and the animals were observed for 14 days after treatment before they were sacrificed. Slight nasal discharge was seen in all rats on day one but disappeared on day two (105).

The inhalation LC5O is greater than 5.0 mg/L for both the formulation and the technical product (105,106).
Technical Imazapyr was applied dermally at the following dosages: 0, 100, 200 and 400 mg/kg/day (109). Arsenal was used at 0, 25, 50 and 100% of the formulated solution in sterile saline. Each dose group consisted of 10 male and 10 female rabbits and the test substance was applied to either intact or abraded skin and occluded for 6 hours each day.

The result of the dermal studies with Imazapyr as well as Arsenal were non remarkable with regard to body weights, food consumption, hematology, serum chemistry, clinical observations, necropsy observations and histopathology. It was noted that Arsenal, undiluted, was locally irritating (109).

Subchronic and Chronic Studies (Mammalian)

In the subchronic tests a NOEL for systemic toxicity with dermal administration in rabbits was 400 mg/kg/d (2,109). After dietary administration for 13 weeks in the rat, there was no effect at 10,000 ppm (571. mg/kg/d) which was the highest dose tested (141).

A bioassay is currently underway to evaluate the potential oncogenicity of technical Imazapyr. Groups of 65 rats per sex per dose group have received 0, 1000, 5000 or 10,000 ppm in the diet. Hematology, clinical chemistry and urinalysis tests were conducted at 3, 6 and 12 months and will also be done at 18 months and at study termination. At the 12 month sacrifice the only effect noted was a slight increase in

mean food consumption in all treated female groups. Most of the increases were statistically significant, but they did not always exhibit a dose response. The oncogenicity test is due to be submitted to the EPA in the spring of 1989 (115).

Oncogenicity Studies

Chronic bioassays as discussed in the subchronic/chronic section are underway.

Mutagenicity Testing

Five different bacterial strains of Salmonella typhimurium (TA1535, TA98, TAlOO, TA1537, and TA1538) and one of Escherichia coli (WP-2 uvrA-) were used to evaluate the mutagenicity of Imazapyr. It is unclear whether the compound used was technical or formulated Imazapyr. Dose levels up to 5000 micrograms/plate were used and each strain was evaluated both in the presence or absence of PCB—induced rat liver 5—9 microsomes. Negative results were noted in all assays. The six tester strains were designed to detect either base-pair substitutions or frameshift mutations (113).

Developmental Studies (Mammalian)

Two teratology studies have been done and both of these studies evaluated technical Imazapyr. One study used rats as the test species and the other utilized rabbits (111,112).

Pregnant rats received dosages of 0, 100, 300 or 1000 mg/kg/d of Imazapyr during days 6—15 of gestation. There were 22 rats in the control group and 24, 23 and 22 in the low, mid and high dose groups. All doses were administered orally by gavage. Salivation was noted only during the dosing period in 6 of the 22 females in the highest dose group (1000 mg/kg). No other adverse observations were noted in the treated dams (111). Fetal body weight and crown-rump length data for the treated groups were comparable to controls. Fetal development (external, skeletal and visceral) "revealed no aberrant structural changes which appeared to be the result of the exposure to Imazapyr" (111). The NOEL for maternal toxicity was 300 mg/kg and the NOEL for teratogenicity and fetoxicity was 1000 mg/kg (116).

Four groups of 18 pregnant rabbits were exposed on days 6-18 of gestation to doses of 0, 25, 100, 400 mg/kg/d Imazapyr. There was no statistically significant difference between control and treated groups at any dose (112).

Avian

Acute oral LD5Os of Imazapyr in bobwhite quail and mallard duck were 2150 mg/kg. The 8 day dietary LC5O in the bobwhite quail and mallard duck were greater than 5000 ppm (101).

Invertebrates

The dermal honey bee LD5O for Imazapyr is greater than 100 mg/bee (101). The LD5O (48 hr) was greater than 100 mg/L for the water flea (100).

Aquatic

The LC50s of Imazapyr in the rainbow trout, bluegill sunfish and channel catfish were greater than 100 mg/L (101).

SUMMARY

Imazapyr is a relatively immobile herbicide in the soil profile even when used in sandy and low organic content soils. It is also persistent in soils. The low mobility and persistence may result in off-target movement of Imazapyr from surface erosion of treated soils.

The atypical soil—plant flux characteristics of Imazapyr and delayed maximum soil concentrations indicate that repeated annual applications may result in build—up of Imazapyr in soil. Consequently, an interval is required to allow for the degradation of soil residues before a repeated application is made.

The oral LD5O of Imazapyr in rats is greater than 5000 mg/kg and the dermal LD5O is greater than 2000 mg/kg in rabbits. The oncogenicity bioassay is currently underway and the only effect reported in the interim study was an increase in food consumption in the treated females. No mutagenic effects were observed.

The acute oral LD5Os of Imazapyr and the Arsenal formulation are greater than 5000 mg/kg. In the subchronic 13 week rat study there was no effect observed at the highest dose tested 10,000 ppm. The oncogenicity study is currently underway.

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DuPont™ Escort® XP

herbicide

Dry Flowable

Active Ingredient	*By Weight*
Metsulfuron methyl Methyl 2-[[[[(4-methoxy-6-methyl-1,3,5-triazin-2-yl)amino]-carbonyl]amino]sulfonyl]benzoate	60%
Inert Ingredients	40%
TOTAL	100%

EPA Reg. No. 352-439

KEEP OUT OF REACH OF CHILDREN

CAUTION

FIRST AID

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

IF IN EYES: Hold eye open and rinse slowly and gently with water for 15-20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. Call a poison control center or doctor for further treatment advice.

Have the product container or label with you when calling a poison control center or doctor, or going for treatment. You may also contact 1-800-441-3637 for emergency medical treatment information.

PRECAUTIONARY STATEMENTS

HAZARDS TO HUMANS AND DOMESTIC ANIMALS

CAUTION! Causes eye irritation. Avoid contact with skin, eyes or clothing. Avoid breathing dust or spray mist.

PERSONAL PROTECTIVE EQUIPMENT

Applicators and other handlers must wear:

Long-sleeved shirt and long pants.

Shoes plus socks.

Follow manufacturer's instructions for cleaning/maintaining PPE. If no such instructions for washables, use detergent and hot water. Keep and wash PPE separately from other laundry.

USER SAFETY RECOMMENDATIONS

USERS SHOULD: Wash hands before eating, drinking, chewing gum, using tobacco or using the toilet.

ENVIRONMENTAL HAZARDS

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

This herbicide is injurious to plants at extremely low concentrations. Nontarget plants may be adversely effected from drift and run-off.

IMPORTANT

DO NOT USE ON FOOD OR FEED CROPS EXCEPT AS RECOMMENDED BY THIS LABEL OR SUPPLEMENTAL LABELING. Injury to or loss of desirable trees or other plants may result if the precautions listed below are not followed.

- Do not apply DuPont™ ESCORT® XP herbicide (except as recommended), or drain or flush equipment on or near desirable trees or other plants, or on areas where their roots may extend or in locations where the product may be washed or moved into contact with their roots.
- Do not use on lawns, walks, driveways, tennis courts, or similar areas.
- Prevent drift of spray to desirable plants.
- Do not contaminate any body of water, including irrigation water.
- Keep from contact with fertilizers, insecticides, fungicides and seeds.

Spraying and mixing equipment used with ESCORT® XP must not be used for subsequent applications to food or feed crops with the exception of pastures, rangeland and wheat, as low rates of ESCORT® XP can kill or severely injure most food or feed crops.

GENERAL INFORMATION

ESCORT® XP herbicide is a dispersible granule that is mixed in water and applied as a spray. ESCORT® XP controls many annual and perennial weeds and woody plants in non-crop areas, conifer and hardwood plantations. ESCORT® XP may be used for general weed and brush control, and for the control of certain noxious weeds on noncrop sites, ditchbanks of dry drainage ditches, and for selective weed control in certain types of unimproved turf grass. Do not use on irrigation ditches. ESCORT® XP can also be used for controlling and suppressing undesirable weeds and hardwoods in conifer plantations and weeds in hardwood plantations.

ESCORT® XP controls weeds and woody plants primarily by postemergent activity. Although ESCORT® XP has preemergence activity, best results are generally obtained when ESCORT® XP is applied to foliage after emergence or dormancy break. Generally, for the control of annual weeds, ESCORT® XP provides the best results when applied to young, actively growing weeds. For the control of perennial weeds, applications made at the bud/bloom stage or while the target weeds are in the fall rosette stage may provide the best results. The use rate depends upon the weed species and size at the time of application.

The degree and duration of control may depend on the following:

- weed spectrum and infestation intensity
- weed size at application
- environmental conditions at and following treatment
- soil pH, soil moisture, and soil organic matter.

ESCORT® XP may be applied on conifer and hardwood plantations, and noncrop sites that contain areas of temporary surface water caused by the collection of water between planting beds, in equipment ruts, or in other depressions created by management activities. It is permissible to treat intermittently flooded low lying sites, seasonally dry flood plains and transitional areas between upland and lowland sites when no water is present. It is also permissible to treat marshes, swamps and bogs after water has receded as well as seasonally dry flood deltas. DO NOT make applications to natural or man-made bodies of water such as lakes, reservoirs, ponds, streams and canals.

ENVIRONMENTAL CONDITIONS AND BIOLOGICAL ACTIVITY

ESCORT® XP is absorbed primarily through the foliage of plants, and by the roots to a lesser degree. Plant cell division is generally inhibited in sensitive plants within a few hours following uptake. Two to 4 weeks after application, leaf growth slows followed by discoloration and tissue death. The final affects on annual weeds are evident about 4 to 6 weeks after application. The ultimate affect on perennial weeds and woody plants occurs in the growing season following application.

Warm, moist conditions following treatment promote the activity of ESCORT® XP, while cold, dry conditions may reduce or delay activity. Weeds and brush hardened off by cold weather or drought stress may not be controlled.

The use of a surfactant is recommended to enhance the control of susceptible plants, except where noted. Apply at a minimum rate (concentration) of 1/4% volume/volume (1 quart per 100 gallons of spray solution), or at the manufacturer's recommended rate. Use only EPA approved surfactants containing at least 80% active ingredient. Certain types of surfactants, such as those incorporating acetic acid (i.e. LI- 700), may not be compatible with ESCORT® XP and may result in decreased performance. Certain surfactants may not be suitable for use on desirable plants, such as turf and conifers, listed on this label. Consult the surfactant manufacturer's label for appropriate uses.

Weed and brush control may be reduced if rainfall occurs soon after application.

RESISTANCE

When herbicides that affect the same biological site of action are used repeatedly over several years to control the same weed species in the same field, naturally-occurring resistant biotypes may survive a correctly applied herbicide treatment, propagate, and become dominant in that field. Adequate control of these resistant weed biotypes cannot be expected. If weed control is unsatisfactory, it may be necessary to retreat the problem area using a product affecting a different site of action.

To better manage herbicide resistance through delaying the proliferation and possible dominance of herbicide resistant weed biotypes, it may be necessary to change cultural practices within and between crop seasons such as using a combination of tillage, retreatment, tank-mix partners and/or sequential herbicide applications that have a different site of action. Weed escapes that are allowed to go to seed will promote the spread of resistant biotypes.

It is advisable to keep accurate records of pesticides applied to individual fields to help obtain information on the spread and

dispersal of resistant biotypes. Consult your agricultural dealer, consultant, applicator, and/or appropriate state agricultural extension service representative for specific alternative cultural practices or herbicide recommendations available in your area.

INTEGRATED PEST MANAGEMENT

This product may be used as part of an Integrated Pest Management (IPM) program that can include biological, cultural, and genetic practices aimed at preventing economic pest damage. IPM principles and practices include field scouting or other detection methods, correct target pest identification, population monitoring, and treating when target pest populations reach locally determined action thresholds. Consult your state cooperative extension service, professional consultants or other qualified authorities to determine appropriate action treatment threshold levels for treating specific pest/crop systems in your area.

DIRECTIONS FOR USE

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

DuPont™ ESCORT® XP should be used only in accordance with recommendations on this label or in separately published DuPont recommendations.

DuPont will not be responsible for losses or damages resulting from the use of this product in any manner not specifically recommended by DuPont. User assumes all risks associated with such non-recommended use.

Do not apply more than 4 ounces of ESCORT® XP per acre per year.

Do not use on food or feed crops except as recommended by this label or supplemental labeling.

Do not apply this product in a way that will contact workers or other persons, either directly or through drift. Only protected handlers may be in the area during application.

For any requirements specific to your State or Tribe, consult the agency in your State responsible for pesticide regulation.

TANK MIXES

ESCORT® XP may be tank mixed with other herbicides registered for the use sites described in this label. Use only those tank mix partners which are labeled for the appropriate use site. When tank mixing, use the most restrictive label limitations for each of the products being used in the tank mix.

AGRICULTURAL USES

AGRICULTURAL USE REQUIREMENTS

Use this product only in accordance with its labeling and with the Worker Protection Standard, 40 CFR part 170. This Standard contains requirements for the protection of agricultural workers on farms, forests, nurseries, and greenhouses, and handlers of agricultural pesticides. It contains requirements for training, decontamination, notification, and emergency assistance. It also contains specific instructions and exceptions pertaining to the statements on this label about personal protective equipment (PPE) and restricted-entry interval. The requirements in this box only apply to uses of this product that are covered by the Worker Protection Standard.

Do not enter or allow worker entry into treated areas during the restricted-entry interval (REI) of 4 hours.

PPE required for early entry to treated areas that is permitted under the Worker Protection Standard and that involves contact with anything that has been treated, such as plants, soil, or water is:

- Coveralls
- Shoes plus socks

CONIFER PLANTATIONS

Application Information

ESCORT® XP is recommended for the control of many species of weeds and deciduous trees on sites where conifers are growing or are to be planted. Apply by ground equipment or by air (helicopter only). Refer to the "Weeds Controlled" and "Brush Species Controlled" for a listing of susceptible species.

Application Timing

Apply ESCORT® XP after weeds have emerged or after undesirable hardwoods have broken winter dormancy and have reached the point of full leaf expansion.

Conifer Site Preparation --Application Before Transplanting

After consulting the "Weeds Controlled" and "Brush Species Controlled" tables, apply the rates of ESCORT® XP recommended for the most difficult to control species on the site.

Southeast—Apply up to 4 ounces per acre for loblolly and slash pines. Transplant the following planting season.

Northeast and Lake States—Apply up to 2 ounces per acre for red pine. Transplant the following planting season. Apply up to 2 ounces per acre for black, white and Norway spruce. Transplant the following spring.

West—Apply up to 2 ounces per acre prior to planting Douglas Fir, Sitka Spruce, Western Red Cedar, Western Hemlock, Ponderosa Pine, and Grand Fir in the Coast Rangeland and western slope of the Cascades in Oregon and Washington. These conifer species listed can be planted anytime after application. Other conifer species can be planted providing the user has prior experience indicating acceptable tolerance to ESCORT® XP soil residues.

Without prior experience, it is recommended that other species be planted on a small scale to determine selectivity before large-scale plantings are made as unacceptable injury may occur. DuPont will not assume responsibility for injury to any conifer species not listed on this label.

Tank Mix Combinations—

For broader spectrum control, the following products are recommended in combination with DuPont™ ESCORT® XP.

"Accord"

Tank mix 1 to 2 ounces of ESCORT® XP with 2 to 10 quarts of "Accord" per acre. Refer to the product container for a list of species controlled.

"Arsenal" Applicator's Concentrate

Tank mix 1 to 2 ounces of ESCORT® XP with 10 to 24 fluid ounces of "Arsenal" Applicator's Concentrate per acre. Loblolly and slash pines may be transplanted the planting season following application. This combination controls ash, black gum, cherry, hawthorn, honeysuckle, hophornbeam, persimmon, oaks (red, white and water), sassafras, sweetgum, Vaccinium species, and suppresses blackberry, dogwood, elms, myrtle dahoon, hickories, and red maple.

"Accord" + "Arsenal" Applicators Concentrate

Tank mix 1/2 to 1 ounce of ESCORT® XP with 16 to 64 fluid ounces of "Accord" and 10 to 12 fluid ounces of "Arsenal" Applicator's Concentrate per acre. Slash and loblolly pines may be transplanted the planting season following application. This combination controls cherry, dogwood, elms, oaks (red and water), persimmon, sassafras, sweetgum and suppresses hickory.

DuPont™ VELPAR® L or VELPAR® DF

Tank mix 1 to 2 ounces of ESCORT® XP per acre with VELPAR® L or VELPAR® DF at the rates recommended on the container for various soil textures. Loblolly and slash pines may be transplanted the planting season following application. Refer to the product container for a list of species controlled.

DuPont™ OUST® EXTRA

Tank mix 1/2 to 1 1/2 ounces of ESCORT® XP with 2 to 3 ounces of OUST® EXTRA per acre for herbaceous weed control. Refer to the product container and the "Weeds Controlled" section of this label for a listing of the weeds controlled. Loblolly and slash pines may be transplanted the planting season following application. Tank mix 2 ounces of ESCORT® XP with 3 ounces of OUST® EXTRA per acre for herbaceous weed control and early spring suppression of bull thistle and Canada thistle in the Coast Rangeland and western slope of the Cascade Mountains. Douglas fir may be transplanted at least 90 days following application.

Release--Hardwood Control and Suppression

ESCORT® XP is recommended for application over the top of established slash and loblolly pine to control the species listed in "Weeds Controlled" and "Brush Species Controlled" section of this label. Apply 1 to 4 ounces per acre to control the species indicated, including kudzu.

Tank Mix Combinations—

For broader spectrum control the following products are recommended in combination with ESCORT® XP.

"Arsenal" Applicator's Concentrate

Tank mix 1 to 2 ounces of ESCORT® XP with 8 to 16 fluid ounces of "Arsenal" Applicator's Concentrate per acre for application to loblolly pine. Refer to the "Arsenal" Applicator's Concentrate label regarding the use of surfactants and the appropriate application timing with respect to the age and development stage of the pines. This combination controls ash, black gum, cherry, hawthorn, honeysuckle, hophornbeam, oaks (red, white and water), sassafras, sweetgum, Vaccinium species, and suppresses blackberry, dogwood, elms, myrtle dahoon, hickories, persimmon, and red maple.

VELPAR® L or VELPAR® DF

Tank mix 1 to 2 ounces of ESCORT® XP with VELPAR® L or VELPAR® DF at the rates recommended on the container for various soil textures. This combination may be applied to loblolly and slash pines.

Release--Herbaceous Weed Control

ESCORT® XP may be applied to transplanted loblolly and slash pine for the control of herbaceous competition. Consult the "Weeds Controlled" for a listing of the susceptible species and recommended application rates. Best results are obtained when ESCORT® XP is applied just before weed emergence until shortly after weed emergence.

Tank Mix Combinations—

For broader spectrum control the following products are recommended in combination with ESCORT® XP.

"Arsenal" Applicators Concentrate

Tank mix 1/2 to 1 ounce of ESCORT® XP with 4 fluid ounces of "Arsenal" Applicators Concentrate per acre. The tank mix may be used on loblolly pine.

OUST® XP

Tank mix 1/2 to 1 1/2 ounces of ESCORT® XP with 2 to 3 ounces of OUST® XP per acre. Best results are obtained when ESCORT® XP is applied just before weed emergence until shortly after weed emergence. This tank mix may be used on loblolly and slash pine.

VELPAR® L or VELPAR® DF

Tank mix 1/2 to 1 ounce of ESCORT® XP with VELPAR® L or VELPAR® DF at the rates recommended on the container for various soil textures. This combination may be applied to loblolly and slash pines.

IMPORTANT PRECAUTIONS —CONIFER PLANTATIONS ONLY

- Applications of ESCORT® XP made to conifers that are suffering from loss of vigor caused by insects, diseases, drought, winter damage, animal damage, excessive soil moisture, planting shock, or other stresses may injure or kill the trees.
- Applications of ESCORT® XP made for herbaceous release should only be made after adequate rainfall has closed the planting slit and settled the soil around the roots following transplanting.
- Do not apply ESCORT® XP to conifers grown as ornamentals.
- ESCORT® XP applications may result in damage and mortality to other species of conifers when they are present on sites with those listed in the preceding recommendations for conifer plantations.

HARDWOOD PLANTATIONS

Application Information

DuPont™ ESCORT® XP is recommended at rates of up to 2 ounces per acre for the control of many weed species on sites where yellow poplar is growing or is to be planted, and on sites where red alder is to be planted. Apply by ground equipment or by air (helicopter only). Refer to the "Weeds Controlled" sections of this label for a listing of susceptible species.

Application Timing

ESCORT® XP may be applied as a site preparation treatment prior to planting red alder or yellow poplar. As a prior to planting site preparation treatment for red alder, ESCORT® XP may be tank mixed with other herbicides labeled for this use.

ESCORT® XP may also be applied over-the-top of planted yellow poplar seedlings after the soil has settled around the root system, but before the seedlings have broken dormancy (prior to bud break).

Release--Herbaceous Weed Control

ESCORT® XP may be applied to yellow poplar for the control of herbaceous competition. Consult the "Weeds Controlled" for a listing of the susceptible species and recommended application rates. Best results are obtained when ESCORT® XP is applied just before weed emergence until shortly after weed emergence.

Tank Mix Combinations—

Tank mix 1/2 ounce of ESCORT® XP with 4 to 6 pints of DuPont™ VELPAR® L as recommended on the package label for "RELEASE--HERBACEOUS WEED CONTROL" in pine plantations in the eastern U.S. Follow the VELPAR® L label recommendations regarding altering the application rate by soil texture.

IMPORTANT PRECAUTIONS —HARDWOOD PLANTATIONS ONLY

- Application of VELPAR® L and ESCORT® XP made to yellow poplar that are suffering from loss of vigor caused by insects, disease, drought, winter damage, animal damage, excessive soil moisture, planting shock or other stresses may injure or kill the seedlings.
- Applications of ESCORT® XP made for release should only be made after adequate rainfall has closed the planting slit and settled the soil around the roots following transplanting.
- The use of surfactant is not recommended for applications made over the tops of trees.
- Careful consideration must be given by an experienced and knowledgeable forester to match the requirements of yellow poplar and/or red alder to the conditions of the site. Treatment of yellow poplar and/or red alder planted on a site inadequate to meet its requirements may injure or kill the seedlings.

NON-AGRICULTURAL USES

NON-AGRICULTURAL USE REQUIREMENTS

The requirements in this box apply to uses of this product that are NOT within the scope of the Worker Protection Standard for agricultural pesticides (40 CFR Part 170). The WPS applies when this product is used to produce agricultural plants on farms, forests, nurseries, or greenhouses.

Do not enter or allow others to enter the treated area until sprays have dried.

Non-crop industrial weed control and selective weed control in turf (industrial, unimproved only) are not within the scope of the Worker Protection Standard.

WEEDS CONTROLLED

1/3 to 1/2 ounce per acre

Annual sowthistle
Aster
Bahiagrass
Beebalm
Bittercress
Bitter sneezeweed
Blackeyed-susan
Blue mustard
Bur buttercup
Chicory
Clover
Cocklebur
Common chickweed
Common groundsel
Common purslane
Common yarrow
Conical catchfly
Corn cockle
Cow cockle
Crown vetch
Dandelion
Dogfennel
False chamomile
Fiddleneck tarweed
Field pennycress
Flixweed
Goldenrod
Lambsquarters
Marestail/horseweed****
Maximillion sunflower
Miners lettuce
Pennsylvania smartweed
Plains coreopsis
Plantain
Redroot pigweed
Redstem filaree
Rough fleabane
Shepherd's purse
Silky crazyweed (locoweed)
Smallseed falseflax
Smooth pigweed
Sweet clover
Tansymustard
Treacle mustard
Tumble mustard
Wild carrot
Wild garlic
Wild lettuce
Wild mustard
Wooly croton
Wood sorrel
Yankeweed

1/2 to 1 ounce per acre

Blackberry
Black henbane
Broom snakeweed*
Buckhorn plantain
Bull thistle
Common crupina
Common sunflower
Curly dock
Dewberry
Dyer's woad
Gorse
Halogeton
Henbit
Honeysuckle
Multiflora rose and other wild roses
Musk thistle***
Oxeye daisy
Plumeless thistle
Prostrate knotweed
Rosering gaillardia
Seaside arrowgrass
Sericea lespedeza
Tansy ragwort
Teasel
Wild caraway

1 to 2 ounces per acre

Common mullein
Common tansy
Field bindweed**
Greasewood
Gumweed
Houndstongue
Lupine
Old world climbing fern (Lygodium)
Perennial pepperweed
Poison hemlock
Purple loosestrife
Purple scabious
Scotch thistle
Scouringrush
Salsify
Snowberry
St. Johnswort
Sulphur cinquefoil
Western salsify
Whitetop (hoary cress)
Wild Iris

1 1/2 to 2 ounces per acre

Canada thistle**
Dalmation toadflax**
Duncecap larkspur
Russian knapweed**
Tall larkspur
Wild parsnip
Yellow toadflax**

3 to 4 ounces per acre

Kudzu

* Apply fall through spring.

** Suppression, which is a visual reduction in weed competition (reduced population or vigor) as compared to untreated areas. Apply as a full coverage spray for best performance.

***Certain biotypes of musk thistle are more sensitive to DuPont™ ESCORT® XP and may be controlled with rates of 1/4 to 1/2 ounce per acre. Treatments of ESCORT® XP may be applied from rosette through bloom stages of development.

****Certain biotypes of marestail/horsetail are less sensitive to ESCORT® XP and may be controlled by tank mixes with herbicides with a different mode of action.

Problem Weed Control

For broader spectrum control and for use on certain biotypes of broadleaf weeds which may be resistant to ESCORT® XP and herbicides with the same mode of action, the following tank mixes are recommended.

Dicamba + 2,4-D

Weed	Rate of ESCORT® XP	Rate of dicamba (fluid ounces/acre)	Rate of 2,4-D (fluid ounces/acre)
Kochia control	1/2	8	16
Spotted knapweed control	1/2	8	16
Rush skeletonweed suppression	1	8	16

NONCROP SITES

Application Information

ESCORT® XP is recommended for general weed control on private, public and military lands as follows: Uncultivated nonagricultural areas (such as airports, highway, railroad and utility rights-of-way, sewage disposal areas, etc.); uncultivated agricultural areas - noncrop producing (such as farmyards, fuel storage areas, fence rows, soil bank land, barrier strips, etc.); industrial sites - outdoor (such as lumberyards, pipeline and tank farms, etc.). It is also recommended for the control of certain noxious and troublesome weeds.

Consult the "Weeds Controlled" and "Brush Species Controlled" tables to determine the appropriate application rate.

ESCORT® XP may be applied in tank mixture with other herbicides labeled for use on non-crop sites. Fully read the labels and follow all directions and restrictions on each label.

Applications may be made by ground or air. Use a sufficient volume of water to ensure thorough coverage of the target vegetation with the application equipment being used.

Application Timing

For best results, ESCORT® XP should be applied postemergence to young, actively growing weeds. Applications may be made at any time of the year, except when the ground is frozen.

GRASS REPLANT INTERVALS

Following an application of ESCORT® XP to non-crop areas, the treated sites may be replanted with various species of grasses at the intervals recommended below.

For soils with a pH of 7.5 or less, observe the following replant intervals:

Species	Rate (ounces per acre)	Replant Interval (months)
Brome, Meadow	1/2—1	2
	1—2	3
Brome, Smooth	1/2—1	2
	1—2	4
Fescue, Alta	1/2—1	2
	1—2	4
Fescue, Red	1/2—1	2
	1—2	4
Fescue, Sheep	1/2—1	1
	1—2	4
Foxtail, Meadow	1/2—1	2
	1—2	4
Green Needlegrass	1/2—2	1
Orchardgrass	1/2—1	2
	1—2	4
Russian wildrye	1/2—1	1
	1	2
	2	3
Switchgrass	1/2—1	1
	1—2	3
Timothy	1/2—1	2
	1—2	4
Wheatgrass, Western	1/2—1	2
	1—2	3

For soils with a pH of 7.5 or greater observe the following replant intervals:

Species	Rate (ounces per acre)	Replant Interval (months)
Alkali Sacaton	1/2—1	1
	1—2	3
Bluestem, Big	1/2—2	3
Brome, Mountain	1/2—1	1
	1—2	2
Gramma, Blue	1/2—2	1
Gramma, Sideoats	1/2	2
	>1/2	>3
Switchgrass	1/2	2
	>1/2	>3
Wheatgrass, Thickspike	1/2—2	1
Wheatgrass, Western	1—2	2
	1/2—1	3

The recommended intervals are for applications made in the Spring to early Summer. Because ESCORT® XP degradation is slowed by cold or frozen soils, applications made in the late Summer or Fall should consider the intervals as beginning in the Spring following treatment. Testing has indicated that there is considerable variation in response among the species of grasses when seeded into areas treated with ESCORT® XP. If species other than those listed above are to be planted into areas treated with ESCORT® XP, a field bioassay should be performed, or previous experience may be used, to determine the feasibility of replanting treated sites.

TURF, INDUSTRIAL (UNIMPROVED ONLY)

Application Information

DuPont™ ESCORT® XP is recommended for selective weed control in unimproved industrial turf where certain grasses are well established and desired as ground cover. ESCORT® XP is also recommended for the control of certain noxious and troublesome weeds in turf.

In addition to conventional spray equipment, ESCORT® XP may also be applied with invert emulsion equipment. When using an invert emulsion, mix the prescribed rate of ESCORT® XP in the water phase.

Consult the "Weeds Controlled" table to determine which weeds will be controlled by the following recommendations:

Turf Type	Rate of ESCORT® XP (ounces/acre)
Fescue and Bluegrass	1/4 to 1/2
Crested Wheatgrass and Smooth Brome	1/4 to 1
Bermudagrass	1/4 to 2

Application Timing

Applications may be made at anytime of the year, except when the soil is frozen.

When a spring application is made on fescue or bluegrass, a second application may be made during the summer after full seedhead maturation.

Growth Suppression and Seedhead Inhibition (Chemical Mowing)

Application Information

ESCORT® XP is recommended for growth suppression and seedhead inhibition in well established fescue and bluegrass turf at the use rate of 1/4 to 1/2 ounce per acre.

Tank Mix Combination

ESCORT® XP may be tank mixed with "Embark" for improved performance in the regulation of growth and seedhead suppression. Tank mix 1/4 to 1/2 ounce of ESCORT® XP with 1/8 to 1/4 pint of "Embark".

Application Timing

Application may be made after at least 2 to 3 inches of new growth has emerged until the appearance of the seed stalk.

Fescue Precautions:

ESCORT® XP may temporarily stunt tall fescue, cause it to turn yellow, or cause seedhead suppression. To minimize these symptoms, take the following precautions:

- Do not use more than 4/10 ounce per acre of ESCORT® XP.
- Tank mix ESCORT® XP with 2,4-D.
- Use the lowest recommended rate for target weeds.
- Use a non-ionic surfactant at 1/2 to 1 pint per 100 gallons of spray solution.
- Make application later in the spring after the new growth is 5 to 6 inches tall, or in the fall.
- Do not use a surfactant when liquid nitrogen is used as a carrier.
- Do not use a spray adjuvant other than non-ionic surfactant.
- The yields from the first cutting may be reduced due to seedhead suppression resulting from treatment with ESCORT® XP.

IMPORTANT PRECAUTIONS —INDUSTRIAL TURF ONLY

- An application of ESCORT® XP may cause temporary discoloration (chlorosis) of the grasses. Use the lower recommended rates for minimum discoloration.
- With fescue and bluegrass, sequential applications made during the same or consecutive growth periods (i.e. spring and fall) may result in excessive injury to turf.
- Excessive injury may result when ESCORT® XP is applied to turf that is under stress from drought, insects, disease, cold temperatures (winter injury) or poor fertility.
- ESCORT® XP is not recommended for use on bahiagrass.

NATIVE GRASSES

ESCORT® XP is recommended for weed control and suppression in the establishment and maintenance of native grasses. It may be used where blue grama, bluestems (big, little, plains, sand, ww spar) bromegrasses (meadow), buffalograss, green sprangletop, indiangrass, kleingrass, lovegrasses (atherstone, sand, weeping, wilman), orchardgrass, sideoats grama, switchgrass (blackwell), wheatgrass (bluebunch, intermediate, pubescent Siberian, slender, streamband, tall, thickspike, western), and Russian wildrye are established. It may also be applied over these species in the seedling stage, except for orchardgrass and Russian wildrye.

Application Information

Apply ESCORT® XP at the rate of 1/10 ounce per acre for the control and suppression* of bur buttercup (testiculate), common purslane, common sunflower*, cutleaf eveningprimrose*, flixweed*, lambsquarters* (common and slimleaf), marestail*, pigweed (redroot and tumble), snow speedwell, tansymustard* and tumble mustard (Jim Hill mustard).

* Suppression is a visual reduction in weed competition (reduced population or vigor) as compared to untreated areas. Degree of suppression will vary with the size of weed and environmental conditions following treatment.

Application Timing

For established grasses, apply when weeds are in the seedling stage.

For grasses in the seedling stage, apply preplant or preemergence where the soil (seed bed) has been cultivated.

IMPORTANT PRECAUTIONS —NATIVE GRASSES

- Grass species or varieties may differ in their response to various herbicides. DuPont recommends that you first consult your state experimental station, university, or extension agent as to sensitivity to any herbicide. If no information is available, limit the initial use of ESCORT® XP to a small area. Components in a grass seed mixture will vary in tolerance to ESCORT® XP, so the final stand may not reflect the seed ratio.
- Under certain conditions such as heavy rainfall, high pH, prolonged cold weather, or wide fluctuations in day/night temperatures prior to or soon after ESCORT® XP application, temporary discoloration and/or grass injury may occur. ESCORT® XP should not be applied to grass

that is stressed by severe weather conditions, drought, low fertility, water-saturated soils, disease, or insect damage as grass injury may result. Severe winter stress, drought, disease, or insect damage before or following application also may result in grass injury.

BRUSH CONTROL

Application Information

DuPont™ ESCORT® XP is recommended for the control of undesirable brush growing in non-crop areas. Applications may be made by air, high volume ground application, low volume ground application and ultra-low volume ground application. Except as noted for multiflora rose, ESCORT® XP should be applied as a spray to the foliage.

The application volume required will vary with the height and density of the brush and the application equipment used. Generally, aerial applications will require 15 to 25 gallons of water per acre; high volume ground application will require 100 to 400 gallons of water per acre; low volume ground application will require 20 to 50 gallons of water per acre; and ultra-low volume ground application will require 10 to 20 gallons of water per acre.

Regardless of the application volume and equipment used, thorough coverage of the foliage, particularly the terminal growing points, is necessary to optimize results.

BRUSH SPECIES CONTROLLED

Species	High Volume Rate (ounces/100 gallon)	Broadcast Rate (ounces/acre)
Ash	1—2	1—3
Aspen	1—2	1—3
Black locust	1—2	1—3
Blackberry	1—2	1—3
Camelthorn	1—2	1—3
Cherry	1—2	1—3
Cottonwood	1—2	2—3
Eastern red cedar	1—2	2—3
Elder	1—2	2—3
Elm	1—2	1—3
Firs	3	1—2
Hawthorn	1—2	1—3
Honeysuckle	1—2	1/2—1
Mulberry	1—2	2—3
Multiflora rose	1—2	1—3
Muscadine (wild grape)	1—2	2—3
Oaks	1—2	1—3
Ocean spray (*Holodiscus*)	1—2	2—3
Osage orange	1—2	2—3
Red maple	1—2	2—3
Salmonberry	1/2—1	1—3
Snowberry	1/2—1	1—3
Spruce (black and white)	3	2—3
Thimbleberry	1/2—1	1—3
Tree of heaven (*Ailanthus*)	1—2	1—2
Tulip tree	1/2—1	1—3
Wild roses	1/2—1	1—3
Willow	1/2—1	1—3

For low volume and ultra-low volume ground applications, mix 4 to 8 ounces of ESCORT® XP per 100 gallons of spray solution.

Application Timing

Make a foliar application of the recommended rate of ESCORT® XP during the period from full leaf expansion in the spring until the development of full fall coloration on deciduous species to be controlled. Coniferous species may be treated at anytime during the growing season.

Tank Mix Combinations—

ESCORT® XP may be tank mixed with any product labeled for noncrop brush control at the application rates specified on the companion product's label for the pests specified on the product's companion label. Read and follow the label instructions of both products when tank mixing. Follow the most restrictive limitations of any of the product labels being tank mixed.

Low Rate Applications

"Arsenal" herbicide

Combine 1 to 2 ounces of ESCORT® XP with 1 to 4 pints of "Arsenal" herbicide per acre and apply as a broadcast spray. Aerial applications should use a minimum of 15 gallons per acre spray volume. In addition to species listed above controlled by ESCORT® XP, this combination controls black gum, hophornbeam, sassafras, sweetgum, Vaccinium species, dogwood, myrtle dahoon, hickories, and persimmon.

"Tordon" K + "Arsenal" herbicide

Combine 1 to 1 1/2 ounce of ESCORT® XP with 2 to 8 fluid ounces of "Arsenal" and 1 to 2 pints of "Tordon" K per 100 gallons of water. Apply as a high volume spray. This tank mix controls cherry, elms, box elder, maples, hackberry, redbud, ash, oaks (including shingle oak), black locust and sassafras.

*"Tordon" K is a restricted use pesticide.

Spotgun Basal Soil Treatment

For control of multiflora rose, prepare a spray suspension of ESCORT® XP by mixing 1 ounce per gallon of water. Mix vigorously until the ESCORT® XP is dispersed and agitate periodically while applying the spray suspension.

Apply the spray preparation with an exact delivery handgun applicator. Apply at the rate of 4 milliliters for each 2 feet of rose canopy diameter. Direct the treatment to the soil within 2 feet of the stem union. When treating large plants and more than one delivery is required, make applications on opposite sides of the plant.

Applications should be made from early spring to summer.

IMPORTANT PRECAUTIONS —NON-CROP BRUSH ONLY

- When using tank mixtures of ESCORT® XP with companion herbicides, read and follow all use instructions, application rates, warnings and precautions appearing on the labels. Follow the most restrictive label instructions for each of the herbicides used.

SPRAY EQUIPMENT

Spraying and mixing equipment used with ESCORT® XP must not be used for subsequent applications to food or feed crops with the exception of pastures, rangeland and wheat, as low rates of ESCORT® XP can kill or severely injure most food or feed crops.The selected sprayer should be equipped with an agitation system to keep ESCORT® XP suspended in the spray tank.

The selected sprayer should be equipped with an agitation system to keep ESCORT® XP suspended in the spray tank. Use a sufficient volume of water to thoroughly cover the foliage of undesirable weeds, generally 10 to 40 gallons per acre. Select a spray volume and delivery system that will deliver a uniform spray pattern. Be sure the sprayer is

calibrated before use. Avoid overlapping and shut off spray booms while starting, turning, slowing or stopping to avoid injury to desired plants.
Refer to the brush control section of this label for information unique to that particular use.

MIXING INSTRUCTIONS

1. Fill the tank 1/4 to 1/3 full of water.
2. While agitating, add the required amount of DuPont™ ESCORT® XP.
3. Continue agitation until the ESCORT® XP is fully dispersed, at least 5 minutes.
4. Once the ESCORT® XP is fully dispersed, maintain agitation and continue filling tank with water. ESCORT® XP should be thoroughly mixed with water before adding any other material.
5. As the tank is filling, add tank mix partners (if desired) then add the necessary volume of nonionic surfactant. Always add surfactant last.
6. If the mixture is not continuously agitated, settling will occur. If settling occurs, thoroughly re-agitate before using.
7. ESCORT® XP spray preparations are stable if they are pH neutral or alkaline and stored at or below 100° F.
8. If ESCORT® XP and a tank mix partner are to be applied in multiple loads, pre-slurry the ESCORT® XP in clean water prior to adding to the tank. This will prevent the tank mix partner from interfering with the dissolution of the ESCORT® XP.

SPRAYER CLEANUP

Spray equipment must be cleaned before ESCORT® XP is sprayed. Follow the cleanup procedures specified on the labels of previously applied products. If no directions are provided, follow the six steps outlined below.

At the End of the Day

When multiple loads of ESCORT® XP herbicide are applied, it is recommended that at the end of each day of spraying, the interior of the tank be rinsed with fresh water and then partially filled, and the boom and hoses flushed. This will prevent the buildup of dried pesticide deposits that can accumulate in the application equipment.

1. Drain tank; thoroughly rinse spray tanks, boom, and hoses with clean water. Loosen and physically remove any visible deposits.
2. Fill the tank with clean water and 1 gal of household ammonia* (contains 3% active) for every 100 gal of water. Flush the hoses, boom, and nozzles with the cleaning solution. Then add more water to completely fill the tank. Circulate the cleaning solution through the tank and hoses for at least 15 min. Flush the hoses, boom, and nozzles again with the cleaning solution, and then drain the tank.
3. Remove the nozzles and screens and clean separately in a bucket containing cleaning agent and water.
4. Repeat step 2.
5. Rinse the tank, boom, and hoses with clean water.
6. If only ammonia is used as a cleaner, the rinsate solution may be applied back to the crop(s) recommended on this label. Do not exceed the maximum labeled use rate. If other cleaners are used, consult the cleaner label for rinsate disposal instructions. If no instructions are given, dispose of the rinsate on site or at an approved waste disposal facility.

* Equivalent amounts of an alternate-strength ammonia solution or a DuPont-approved cleaner can be used in the cleanout procedure. Carefully read and follow the individual cleaner instructions. Consult your agricultural dealer, applicator, or DuPont representative for a listing of approved cleaners.

Notes:

1. **Attention:** Do not use chlorine bleach with ammonia, as dangerous gases will form. Do not clean equipment in an enclosed area.
2. Steam-cleaning aerial spray tanks is recommended prior to performing the above cleanout procedure to facilitate the removal of any caked deposits.
3. When ESCORT® XP is tank mixed with other pesticides, all required cleanout procedures should be examined and the most rigorous procedure should be followed.
4. In addition to this cleanout procedure, all precleanout guidelines on subsequently applied products should be followed as per the individual labels.

SPRAY DRIFT MANAGEMENT

The interaction of many equipment and weather-related factors determines the potential for spray drift. The applicator is responsible for considering all these factors when making application decisions.

AVOIDING SPRAY DRIFT IS THE RESPONSIBILITY OF THE APPLICATOR.

IMPORTANCE OF DROPLET SIZE

The most effective way to reduce drift potential is to apply large droplets (>150 - 200 microns). The best drift management strategy is to apply the largest droplets that provide sufficient coverage and control. The presence of sensitive species nearby, the environmental conditions, and pest pressure may affect how an applicator balances drift control and coverage. APPLYING LARGER DROPLETS REDUCES DRIFT POTENTIAL, BUT WILL NOT PREVENT DRIFT IF APPLICATIONS ARE MADE IMPROPERLY OR UNDER UNFAVORABLE ENVIRONMENTAL CONDITIONS! See **Wind, Temperature and Humidity, and Temperature Inversions** sections of this label.

Controlling Droplet Size - General Techniques

- **Volume** - Use high flow rate nozzles to apply the highest practical spray volume. Nozzles with higher rated flows produce larger droplets.
- **Pressure** - Use the lower spray pressures recommended for the nozzle. Higher pressure reduces droplet size and does not improve canopy penetration. WHEN HIGHER FLOW RATES ARE NEEDED, USE A HIGHER-CAPACITY NOZZLE INSTEAD OF INCREASING PRESSURE.

- **Nozzle Type** - Use a nozzle type that is designed for the intended application. With most nozzle types, narrower spray angles produce larger droplets. Consider using low-drift nozzles.

Controlling Droplet Size - Aircraft

- **Number of Nozzles** - Use the minimum number of nozzles with the highest flow rate that provide uniform coverage.
- **Nozzle Orientation** - Orienting nozzles so that the spray is emitted backwards, parallel to the airstream will produce larger droplets than other orientations.
- **Nozzle Type** - Solid stream nozzles (such as disc and core with swirl plate removed) oriented straight back produce larger droplets than other nozzle types.
- **Boom Length** - The boom length should not exceed 3/4 of the wing or rotor length - longer booms increase drift potential.
- **Application Height** - Application more than 10 ft above the canopy increases the potential for spray drift.

BOOM HEIGHT

Setting the boom at the lowest labeled height (if specified) which provides uniform coverage reduces the exposure of droplets to evaporation and wind. For ground equipment, the boom should remain level with the crop and have minimal bounce.

WIND

Drift potential increases at wind speeds of less than 3 mph (due to inversion potential) or more than 10 mph. However, many factors, including droplet size and equipment type determine drift potential at any given wind speed. AVOID GUSTY OR WINDLESS CONDITIONS. Note: Local terrain can influence wind patterns. Every applicator should be familiar with local wind patterns and how they affect spray drift.

TEMPERATURE AND HUMIDITY

When making applications in hot and dry conditions, set up equipment to produce larger droplets to reduce effects of evaporation.

TEMPERATURE INVERSIONS

Drift potential is high during a temperature inversion. Temperature inversions restrict vertical air mixing, which causes small suspended droplets to remain close to the ground and move laterally in a concentrated cloud. Temperature inversions are characterized by increasing temperature with altitude and are common on nights with limited cloud cover and light to no wind. They begin to form as the sun sets and often continue into the morning. Their presence can be indicated by ground fog; however, if fog is not present, inversions can also be identified by the movement of smoke from a ground source or an aircraft smoke generator. Smoke that layers and moves laterally in a concentrated cloud (under low wind conditions) indicates an inversion, while smoke that moves upward and rapidly dissipates indicates good vertical air mixing.

SHIELDED SPRAYERS

Shielding the boom or individual nozzles can reduce the effects of wind. However, it is the responsibility of the applicator to verify that the shields are preventing drift and not interfering with uniform deposition of the product.

USE PRECAUTIONS

- Do not drain or flush equipment on or near desirable trees or other plants, or on areas where their roots may extend, or in locations where the product may be washed or moved into contact with their roots, as injury or loss of desirable trees or other plants may result
- Treatment of powdery, dry soil or light, sandy soil when there is little likelihood of rainfall soon after treatment may result in off target movement and possible damage to susceptible crops when soil particles are moved by wind or water. Injury to crops may result if treated soil is washed, blown, or moved onto land used to produce crops. Exposure to DuPont™ ESCORT® XP may injure or kill most crops. Injury may be more severe when the crops are irrigated. Do not apply ESCORT® XP when these conditions are identified and powdery, dry soil or light or sandy soils are known to be prevalent in the area being treated.
- Applications made where runoff water flows onto agricultural land may injure crops. Applications made during periods of intense rainfall, to soils saturated with water, to surfaces paved with materials such as asphalt or concrete, or to soils through which rainfall will not readily penetrate may result in runoff and movement of ESCORT® XP. Do not treat frozen soil. Treated soil should be left undisturbed to reduce the potential for ESCORT® XP movement by soil erosion due to wind or water.
- Do not use on lawns, walks, driveways, tennis courts or similar areas.
- Do not apply through any type of irrigation system.
- Spraying and mixing equipment used with ESCORT® XP must not be used for subsequent applications to food or feed crops with the exception of pastures, rangeland and wheat, as low rates of ESCORT® XP can kill or severely injure most food or feed crops.
- When used as directed, there are no grazing or haying restrictions for use rates of 1 2/3 ounce per acre and less. At use rates of 1 2/3 to 3 1/3 ounce per acre, forage grasses may be cut for hay, fodder or green forage and fed to livestock, including lactating animals, 3 days after treatment.
- Do not use this product in the following counties of Colorado: Saguache, Rio Grande, Alamosa, Costilla and Conejos.
- Do not use this product in California.

STORAGE AND DISPOSAL

Pesticide Storage: Store product in original container only. Do not contaminate water, other pesticides, fertilizer, food or feed in storage. Store in a cool, dry place.

Pesticide Disposal: Do not contaminate water, food, or feed by disposal. Waste resulting from the use of this product may be disposed of on site or at an approved waste disposal facility.

Container Disposal: For Plastic Containers: Triple rinse (or equivalent). Then offer for recycling or reconditioning, or puncture and dispose of in a sanitary landfill, or incineration, or, if allowed by State and local authorities, by burning. If burned, stay out of smoke. **For Fiber Sacks:** Completely empty fiber sack by shaking and tapping sides and bottom to loosen clinging particles. Empty residue into manufacturing or application equipment. Then dispose of sack in a sanitary landfill or by incineration if allowed by State and local authorities. **For Fiber Drums With Liners:** Completely empty liner by shaking and tapping sides and bottom to loosen clinging particles. Empty residue into application equipment. Then dispose of liner in a sanitary landfill or by incineration if allowed by State and local authorities. If drum is contaminated and cannot be reused, dispose of in the same manner. **For Bags Containing Water Soluble Packets:** Do not reuse the outer box or the resealable plastic bag. When all water-soluble packets are used, the outer packaging should be clean and may be disposed of in a sanitary landfill or by incineration, or if allowed by State and local authorities, by open burning. If burned, stay out of smoke. If the resealable plastic bag contacts the formulated product in any way, the bag must be triple rinsed with clean water. Add the rinsate to the spray tank and dispose of the outer wrap as described above. **For Metal Containers (non aerosol):** Triple rinse (or equivalent) the container. Then offer for recycling or reconditioning, or puncture and dispose of in a sanitary landfill, or by other procedures approved by State and local authorities. **For Paper and Plastic Bags:** Completely empty bag into application equipment. Then dispose of empty bag in a sanitary landfill or by incineration, or, if allowed by State and local authorities, by burning. If burned, stay out of smoke.

NOTICE TO BUYER: Purchase of this material does not confer any rights under patents of countries outside of the United States.

SL - 914N 031705 10-07-04

LIMITATION OF WARRANTY AND LIABILITY

NOTICE: Read This Limitation of Warranty and Liability Before Buying or Using This Product. If the Terms Are Not Acceptable, Return the Product at Once, Unopened, and the Purchase Price Will Be Refunded.

It is impossible to eliminate all risks associated with the use of this product. Such risks arise from weather conditions, soil factors, off target movement, unconventional farming techniques, presence of other materials, the manner of use or application, or other unknown factors, all of which are beyond the control of DuPont. These risks can cause: ineffectiveness of the product; crop injury, or; injury to non-target crops or plants.

DuPont does not agree to be an insurer of these risks. WHEN YOU BUY OR USE THIS PRODUCT, YOU AGREE TO ACCEPT THESE RISKS.

DuPont warrants that this product conforms to the chemical description on the label thereof and is reasonably fit for the purpose stated in the Directions for Use, subject to the inherent risks described above, when used in accordance with the Directions for Use under normal conditions.

DUPONT MAKES NO OTHER EXPRESS OR IMPLIED WARRANTY OF FITNESS OR OF MERCHANTABILITY OR ANY OTHER EXPRESS OR IMPLIED WARRANTY.

IN NO EVENT SHALL DUPONT OR SELLER BE LIABLE FOR ANY INCIDENTAL, CONSEQUENTIAL OR SPECIAL DAMAGES RESULTING FROM THE USE OR HANDLING OF THIS PRODUCT. BUYER'S OR USER'S BARGAINED-FOR EXPECTATION IS CROP PROTECTION. THE EXCLUSIVE REMEDY OF THE USER OR BUYER AND THE EXCLUSIVE LIABILITY OF DUPONT OR SELLER, FOR ANY AND ALL CLAIMS, LOSSES, INJURIES OR DAMAGES (INCLUDING CLAIMS BASED ON BREACH OF WARRANTY OR CONTRACT, NEGLIGENCE, TORT OR STRICT LIABILITY), WHETHER FROM FAILURE TO PERFORM OR INJURY TO CROPS OR OTHER PLANTS, AND RESULTING FROM THE USE OR HANDLING OF THIS PRODUCT, SHALL BE THE RETURN OF THE PURCHASE PRICE OF THE PRODUCT, OR AT THE ELECTION OF DUPONT OR SELLER, THE REPLACEMENT OF THE PRODUCT.

DuPont or its Ag Retailer must have prompt notice of any claim so that an immediate inspection of buyer's or user's growing crops can be made. Buyer and all users shall promptly notify DuPont or a DuPont Ag Retailer of any claims, whether based on contract, negligence, strict liability, other tort or otherwise or be barred from any remedy.

This Limitation of Warranty and Liability may not be amended by any oral or written agreement.

For product information call: 1-888-6-DUPONT
Internet address: http://cropprotection.dupont.com/

The MSDS format adheres to the standards and regulatory requirements of the United States and may not meet regulatory requirements in other countries.

"DuPont" "ESCORT" XP HERBICIDE
M0000459 Revised 1-JUN-2005

CHEMICAL PRODUCT/COMPANY IDENTIFICATION

Material Identification

"ESCORT" is a registered trademark of DuPont.

"DuPont" is a trademark of DuPont.

Grade : 60% FORMULATION

Tradenames and Synonyms

METSULFURON METHYL
"ESCORT" 60DF

Company Identification

MANUFACTURER/DISTRIBUTOR
DuPont
1007 Market Street
Wilmington, DE 19898

PHONE NUMBERS
Product Information : 1-800-441-7515 (outside the U.S. 302-774-1000)
Transport Emergency : CHEMTREC 1-800-424-9300(outside U.S. 703-527-3887)
Medical Emergency : 1-800-441-3637 (outside the U.S. 302-774-1000)

COMPOSITION/INFORMATION ON INGREDIENTS

Components

Material	CAS Number	%
METSULFURON METHYL (METHYL 2-[[[[(4-METHOXY-6-METHYL-1,3,5-TRIAZIN-2-YL)AMINO]CARBONYL]AMINO]SULFONYL] BENZOATE)	74223-64-6	60
INERT INGREDIENTS		40

HAZARDS IDENTIFICATION

Emergency Overview

CAUTION! Causes eye irritation. Avoid contact with skin, eyes or clothing. Avoid breathing dust or spray mist.

Potential Health Effects

Based on animal data, eye contact with ESCORT XP may cause eye irritation with tearing, pain or blurred vision.

Based on animal data, repeated dermal contact with the active ingredient may cause skin irritation with itching, burning, redness, swelling or rash.

Carcinogenicity Information

None of the components present in this material at concentrations equal to or greater than 0.1% are listed by IARC, NTP, OSHA or ACGIH as a carcinogen.

FIRST AID MEASURES

First Aid

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

IF IN EYES: Hold eye open and rinse slowly and gently with water for 15-20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. Call a poison control center or doctor for further treatment advice.

IF SWALLOWED: No specific intervention is indicated as the product is not likely to be hazardous by ingestion. Consult a physician if necessary.

IF INHALED: No specific intervention is indicated as the product is not likely to be hazardous by inhalation. Consult a physician if necessary.

Have the product container or label with you when calling a poison control center or doctor, or going for treatment. You may also contact 1-800-441-3637 for emergency medical treatment information.

FIRE FIGHTING MEASURES

Flammable Properties

Not a fire or explosion hazard.

Like most organic powders or crystals, under severe dusting conditions, this material may form explosive mixtures in air.

Extinguishing Media

Water Spray, Foam, Dry Chemical, CO2.

Fire Fighting Instructions

Evacuate personnel to a safe area. Wear self-contained breathing apparatus. Wear full protective equipment. Use water spray. Runoff from fire control may be a pollution hazard.

If area is exposed to fire and conditions permit, let fire burn itself out. Burning chemicals may produce by-products more toxic than the original material. If product is on fire, wear self-contained breathing apparatus and full protective equipment. Use water spray. Control runoff.

ACCIDENTAL RELEASE MEASURES

Safeguards (Personnel)

NOTE: Review FIRE FIGHTING MEASURES and HANDLING (PERSONNEL) sections before proceeding with clean-up. Use appropriate PERSONAL PROTECTIVE EQUIPMENT during clean-up.

Emergency Response - Chemical resistant coveralls, waterproof gloves, waterproof boots and face/eye protection. If dusting occurs, use NIOSH approved respirator protection.

Initial Containment

Dike spill. Prevent material from entering sewers, waterways, or low areas.

Follow applicable Federal, State/Provincial and Local laws/ regulations.

Spill Clean Up

Shovel or sweep up.

HANDLING AND STORAGE

Handling (Personnel)

Avoid breathing vapors or mist. Avoid breathing dust. Avoid contact with eyes, skin, or clothing. Wash thoroughly after handling. Wash clothing after use. Do not store or consume food, drink or tobacco in areas where they may become contaminated with this material.

USERS SHOULD: Wash hands before eating, drinking, chewing gum, using tobacco or using the toilet.

Handling (Physical Aspects)

Keep away from heat, sparks and flames.

Storage

Store product in original container only. Do not contaminate water, other pesticides, fertilizer, food or feed in storage. Store in a cool, dry place. Do not store or consume food, drink or tobacco in areas where they may become contaminated with this material.

EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls

Use only with adequate ventilation.

Personal Protective Equipment

Always follow the label instructions when handling this product.

Applicators and other handlers must wear:

Long-sleeved shirt and long pants.
Shoes plus socks.

Follow manufacturer's instructions for cleaning/maintaining PPE. If no such instructions for washables, use detergent and hot water. Keep and wash PPE separately from other laundry.

PPE required for early entry to treated areas that is permitted under the Worker Protection Standard and that involves contact with anything that has been treated, such as plants, soil, or water is:

Coveralls.
Shoes plus socks.

Exposure Guidelines

Applicable Exposure Limits

METSULFURON METHYL

PEL	(OSHA)	: None Established
TLV	(ACGIH)	: None Established
AEL *	(DuPont)	: 10 mg/m3, 8 & 12 Hr. TWA

* AEL is DuPont's Acceptable Exposure Limit. Where governmentally imposed occupational exposure limits which are lower than the AEL are in effect, such limits shall take precedence.

PHYSICAL AND CHEMICAL PROPERTIES

Physical Data

Solubility in Water	: Dispersible
Odor	: Slight
Form	: Solid granule
Color	: Light brown
Specific Gravity	: 1.47 @ 25C (77F)

Bulk Density (Tap Bulk Density) : 0.64 - 0.74 g/mL

STABILITY AND REACTIVITY

Chemical Stability

Stable at normal temperatures and storage conditions.

Incompatibility with Other Materials

None reasonably foreseeable.

Decomposition

Decomposition will not occur.

Polymerization

Polymerization will not occur.

TOXICOLOGICAL INFORMATION

Animal Data

ESCORT XP

Oral LD50:	> 5000 mg/kg in rats (Very low toxicity)
Skin LD50:	> 2000 mg/kg in rabbits (Slight to moderate toxicity)

ESCORT XP is a slight eye irritant, but is not a skin irritant or skin sensitizer in animal tests.

(TOXICOLOGICAL INFORMATION - Continued)

Metsulfuron Methyl
Inhalation LC50, 4 hr: > 5.3 mg/L in rats
(Very low toxicity)

Single exposures of animals to Metsulfuron Methyl by inhalation caused body weight loss and other nonspecific effects.

Repeated applications of Metsulfuron Methyl to the skin of rabbits caused skin irritation but no other changes were observed.

Repeated oral doses of Metsulfuron Methyl produced decreased body weight gain and decreased liver weights when compared to the control group. Long term administration caused body weight loss.

Animal testing indicates that Metsulfuron Methyl does not have carcinogenic, developmental, or reproductive effects.

There is a report indicating that Metsulfuron Methyl produced genetic damage in a mammalian cell culture test; however, other tests with Metsulfuron Methyl in bacterial and mammalian cell cultures and in animals did not produce genetic damage. The weight of evidence suggests that Metsulfuron Methyl does not cause genetic damage.

ECOLOGICAL INFORMATION

Ecotoxicological Information

AQUATIC TOXICITY:
METSULFURON METHYL
96 hour LC50 - Rainbow trout: > 150 ppm.
96 hour LC50 - Bluegill sunfish: > 150 ppm.

AVIAN TOXICITY:
METSULFURON METHYL
LD50 - Mallard Duck: > 2510 mg/kg.
LC50 - Bobwhite Quail: > 5620 mg/kg

DISPOSAL CONSIDERATIONS

Waste Disposal

Do not contaminate water, food, or feed by disposal. Waste resulting from the use of this product may be disposed of on site or at an approved waste disposal facility.

Treatment, storage, transportation, and disposal must be in accordance with applicable Federal, State/provincial, and local regulations.

ENVIRONMENTAL HAZARDS:

(DISPOSAL CONSIDERATIONS - Continued)

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

This herbicide is injurious to plants at extremely low concentrations. Nontarget plants may be adversely effected from drift and run-off.

Container Disposal

For Plastic Containers: Triple rinse (or equivalent). Then offer for recycling or reconditioning, or puncture and dispose of in a sanitary landfill, or incineration, or, if allowed by state and local authorities, by burning. If burned, stay out of smoke.

For Fiber Sacks: Completely empty fiber sack by shaking and tapping sides and bottom to loosen clinging particles. Empty residue into manufacturing or application equipment. Then dispose of sack in a sanitary landfill or by incineration if allowed by state and local authorities.

For Fiber Drums with Liners: Completely empty liner by shaking and tapping sides and bottom to loosen clinging particles. Empty residue into application equipment. Then dispose of liner in a sanitary landfill or by incineration if allowed by State and local authorities. If drum is contaminated and cannot be reused, dispose of in the same manner.

For Bags Containing Water Soluble Packets: Do not reuse the outer box or the resealable plastic bag. When all water-soluble packets are used, the outer packaging should be clean and may be disposed of in a sanitary landfill or by incineration, or if allowed by State and local authorities, by open burning. If burned, stay out of smoke. If the resealable plastic bag contacts the formulated product in any way, the bag must be triple-rinsed with clean water. Add the rinsate to the spray tank and dispose of the outer wrap as described above.

For Metal Containers (non aerosol): Triple rinse (or equivalent) the container. Then offer for recycling or reconditioning, or puncture and dispose of in a sanitary landfill, or by other procedures approved by State and local authorities.

For Paper and Plastic Bags: Completely empty bag into application equipment. Then dispose of empty bag in a sanitary landfill or by incineration, or, if allowed by State and local authorities, by burning. If burned, stay out of smoke.

TRANSPORTATION INFORMATION

Shipping Information

DOT/IMO
Proper Shipping Name : NOT REGULATED

REGULATORY INFORMATION

U.S. Federal Regulations

TITLE III HAZARD CLASSIFICATIONS SECTIONS 311, 312

Acute : Yes
Chronic : No
Fire : No
Reactivity : No
Pressure : No

In the United States this product is regulated by the US Environmental Protection Agency under the Federal Insecticide, Fungicide and Rodenticide Act. It is a violation of federal law to use this product in a manner inconsistent with its labeling.

EPA Reg. No. 352-439

OTHER INFORMATION

NFPA, NPCA-HMIS

NFPA Rating
Health : 1
Flammability : 1
Reactivity : 0

NPCA-HMIS Rating
Health : 1
Flammability : 1
Reactivity : 0

Personal Protection rating to be supplied by user depending on use conditions.

The data in this Material Safety Data Sheet relates only to the specific material designated herein and does not relate to use in combination with any other material or in any process.

Responsibility for MSDS: DuPont Crop Protection
Address : Wilmington, DE 19898
Telephone : 1-888-638-7668

(Continued)

# Indicates updated section.

This information is based upon technical information believed to be reliable. It is subject to revision as additional knowledge and experience is gained.

End of MSDS

DuPont Crop Protection

SUPPLEMENTAL LABELING

DUPONT™ ESCORT® XP HERBICIDE
SPOT TREATMENT APPLICATION IN RANGE AND NONCROP AREAS

DUPONT™ ESCORT® XP HERBICIDE

EPA Reg. No. 352-439

APPLICATION AS A SPOT TREATMENT TECHNIQUE IN RANGE AND NONCROP AREAS

DIRECTIONS FOR USE

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

DuPont™ ESCORT® XP Herbicide (referred to below as ESCORT®) is recommended for use as spot treatment to control noxious and troublesome weeds on rangeland, noncrop areas such as roadsides and industrial sites including government and private lands.

APPLICATION INFORMATION

ESCORT® is recommended to control many species of weeds, including noxious weeds, in certain established grasses growing on noncrop areas and forage grasses growing on range land. Refer to the "Weeds Controlled" section of the package label or supplemental labeling for a listing of susceptible weed species.

If the sprayer is calibrated, consult the package label or other supplemental labeling to select the application rate per acre of ESCORT® appropriate for the target weeds.

OR

Use the measuring guide enclosed with the ESCORT® 1 ounce container to mix one gram of ESCORT® per one gallon of water along with a suitable surfactant. Spray to the point of wetting the entire surface of the target weeds, approximately 40 gallons of solution per acre.

When applied in this manner there is no grazing restriction following the use of ESCORT®.

APPLICATION TIMING

Applications may be made at anytime of the year, except when the soil is frozen.

USE PRECAUTIONS

- Varieties and species of grasses differ in their tolerance to herbicides. When using ESCORT® on a particular grass for the first time, limit use to a single 1 ounce container. If no injury occurs throughout the season larger acreage may be treated.
- Applications made to some established grasses may cause temporary stunting, yellowing or seedhead suppression (i.e. fescue, timothy).
- Applications made to newly established grasses less than 2 years from seeding may result in injury or loss.
- Do not apply to forage grasses known to be sensitive to ESCORT® such as ryegrass (Italian and perennial), bahia or Garrison's creeping foxtail.
- Broadleaf forage species, such as alfalfa and clover, are highly sensitive to ESCORT® and will be severely injured or killed.
- When used as directed, there is no grazing restriction for use rates of 1 2/3 ounce per acre and less. At use rates of 1 2/3 to 3 1/3 ounce per acre forage grasses may be cut for hay, fodder or green forage and fed to livestock, including lactating animals, 3 days after treatment.

IMPORTANT

BEFORE USING ESCORT® READ AND FOLLOW ALL APPLIABLE DIRECTIONS, RESTRICTIONS AND PRECAUTIONS ON THE EPA-REGISTERED LABEL.

This bulletin contains new or supplemental instructions for use of this product which do not appear on the EPA-registered package label. Follow the instructions carefully.

This labeling must be in the possession of the user at the time of pesticide application.

(Replaces H-64511)

R-301 061404 12-15-99

ARSENAL®

herbicide

For the control of undesirable vegetation in grass pasture, rangeland and noncropland areas such as railroad, utility, pipeline and highway rights-of-way, utility plant sites, petroleum tank farms, pumping installations, fence rows, storage areas, non-irrigation ditchbanks and other similar areas and for the establishment and maintenance of wildlife openings.

ACTIVE INGREDIENT:	
Isopropylamine salt of imazapyr(2-[4,5-dihydro-4-methyl-4-(1-methylethyl)-5-oxo-1*H*-imidazol-2-yl]-3-pyridinecarboxylic acid)*	28.7%
INERT INGREDIENTS	71.3%
TOTAL	100.0%

*Equivalent to 22.6% 2-[4,5-dihydro-4-methyl-4-(1-methylethyl)-5-oxo-1*H*-imidazol-2-yl]-3-pyridinecarboxylic acid or 2 pounds acid per gallon.

EPA Reg. No. 241-346 **U.S. Patent No. 4,798,619** **EPA Est. No.**

KEEP OUT OF REACH OF CHILDREN
CAUTION/PRECAUCIÓN

PRECAUCIÓN AL USUARIO: Si usted no lee inglés, no use este producto hasta que la etiqueta le haya sido explicada ampliamente.

In case of an emergency endangering life or property involving this product, call day or night, 800-832-HELP (4357). See next page for Additional Precautionary Statements.

Net Contents:

BASF Corporation
Agricultural Products
26 Davis Drive
Research Triangle Park, NC 27709

BASF
The Chemical Company

FIRST AID	
If on skin	• Take off contaminated clothing. • Rinse skin immediately with plenty of water for 15-20 minutes. • Call a poison control center or doctor for treatment advice.
If in eyes	• Hold eye open and rinse slowly and gently with water for 15-20 minutes. • Remove contact lenses, if present, after first 5 minutes, then continue rinsing eye. • Call a poison control center or doctor for treatment advice.
If inhaled	• Move person to fresh air. • If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably by mouth-to-mouth, if possible. • Call a poison control center or doctor for further treatment advice.
HOT LINE NUMBER	
Have the product container or label with you when calling a poison control center or doctor or going for treatment. You may also contact BASF Corporation for emergency medical treatment information: 1-800-832-HELP (4357)	

PRECAUTIONARY STATEMENTS
HAZARDS TO HUMANS
CAUTION!

Avoid contact with skin, eyes or clothing. Avoid breathing spray mist. Wash thoroughly with soap and water after handling. Remove contaminated clothing and wash before reuse.

Personal Protective Equipment (PPE):

Some materials that are chemical-resistant to this product are listed below. If you want more options, follow the instructions for category **A** on an EPA chemical-resistant category selection chart.

Applicators and other handlers must wear:

- Long-sleeve shirt and long pants.
- Chemical resistant gloves made of any waterproof material.
- shoes plus socks.

Follow manufacturer's instructions for cleaning and maintaining PPE. If no such instructions for washables, use detergent and hot water. Keep and wash PPE separately from other laundry.

***User Safety* Recommendations:**

Users Should:

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

PHYSICAL AND CHEMICAL HAZARDS

Spray solutions of **Arsenal® herbicide** should be mixed, stored and applied only in stainless steel, fiberglass, plastic and plastic-lined steel containers.

DO NOT mix, store or apply **Arsenal** or spray solutions of **Arsenal** in unlined steel (except stainless steel) containers or spray tanks.

ENVIRONMENTAL HAZARDS

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

DIRECTIONS FOR USE

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

Arsenal should be used only in accordance with recommendations on the leaflet label attached to the container. Keep containers closed to avoid spills and contamination.

AGRICULTURAL USE REQUIREMENTS

Use this product only in accordance with its labeling and with the Worker Protection Standard, 40 CFR part 170. This Standard contains requirements for the protection of agricultural workers on farms, forests, nurseries, and greenhouses, and handlers of agricultural pesticides. It contains requirements for training, decontamination, notification, and emergency assistance. It also contains specific instructions and exceptions pertaining to the statements on this label about personal protective equipment (PPE) and restricted entry interval. The requirements in this box only apply to uses of this product that are covered by the Worker Protection Standard.

DO NOT enter or allow worker entry into treated areas during the restricted entry interval (REI) of **48 hours.**

PPE required for early entry to treated areas that is permitted under the Worker Protection Standard and that involves contact with anything that has been treated, such as plants, soil, or water, is:

- coveralls.
- Shoes plus socks.
- Chemical resistant gloves made of any waterproof material.

NON-AGRICULTURAL USE REQUIREMENTS

The requirements in this box apply to uses of this product that are NOT within the scope of the Worker Protection Standard (WPS) for agricultural pesticides (40 CFR Part 170). The WPS applies when this product is used to produce agricultural plants on farms, forests, nurseries, or greenhouses.

Noncrop weed control is not within the scope of the Worker Protection Standard. See the **GENERAL INFORMATION** section of this label for a description of noncrop sites.

DO NOT enter treated areas without protective clothing until sprays have dried.

STORAGE AND DISPOSAL

DO NOT contaminate water, food or feed by storage or disposal.

PESTICIDE STORAGE: DO NOT store below 10°F.

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 FOR 2.5 GALLON AND 30 GALLON: Triple rinse (or equivalent). Then offer for recycling or reconditioning, or puncture and dispose of in an approved sanitary landfill, or by incineration, or, if allowed by state and local authorities, by burning. If burned, stay out of smoke.

CONTAINER DISPOSAL FOR FIELD KEG, MINIBULK AND BULK: When this container is empty, replace the cap and seal all openings that have been opened during use, and return the container to the point of purchase, or to a designated location. This container must only be refilled with the pesticide product. **DO NOT** reuse the container for any other purpose. Prior to refilling, inspect carefully for damage such as cracks, punctures, abrasions, worn out threads and closure devices. Check for leaks after refilling and before transport. **DO NOT** transport if this container is damaged or leaking. If the container is damaged or leaking, or obsolete and not returned to the point of purchase or to a designated location, triple rinse emptied container and offer for recycling. Disposal of container must be in compliance with state and local regulations.

IMPORTANT

DO NOT use on food crops. Keep from contact with fertilizers, insecticides, fungicides and seeds. **DO NOT** drain or flush equipment on or near desirable trees or other plants, or on areas where their roots may extend, or in locations where the chemical may be washed or moved into contact with their roots. **DO NOT** use on lawns, walks, driveways, tennis courts, or similar areas where roots of desirable vegetation may extend and be exposed to potential injury and/or mortality from root uptake of **Arsenal® herbicide**, unless this risk is acceptable. **DO NOT** side trim desirable vegetation with this product unless severe injury or plant death can be tolerated. Prevent drift of spray to desirable plants.

Clean application equipment after using this product by thoroughly flushing with water.

GENERAL INFORMATION

Use Sites: Arsenal is an aqueous solution to be mixed with water and a surfactant and applied as a spray solution to grass pasture and rangeland and noncropland areas such as railroad, utility, pipeline and highway rights-of-way, utility plant sites, petroleum tank farms, pumping installations, fence rows, storage areas, non-irrigation ditchbanks, including grazed or hayed areas within these sites. **Arsenal** is recommended for the establishment and maintenance of wildlife openings. **Arsenal** may also be used for the release of unimproved bermudagrass (see specific directions) and for use under certain paved surfaces (see specific directions).

Application Methods: Arsenal will control most annual and perennial grasses and broadleaf weeds in addition to many brush and vine species and **Arsenal** will provide residual control of labeled weeds which germinate in the treated areas. This product may be applied either preemergence or postemergence to the weeds; however, postemergence application is the method of choice in most situations, particularly for perennial species. For maximum activity, weeds should be growing vigorously at the time of postemergence application and the spray solution should include a surfactant (See **Adjuvant** Section for specific recommendations). These solutions may be applied selectively by using low-volume techniques or may be applied broadcast by using ground equipment or aerial equipment. In addition, **Arsenal** may also be used for stump and cut stem treatments (see specific directions).

Herbicidal Activity: Arsenal is readily absorbed through leaves, stems, and roots and is translocated rapidly throughout the plant, with accumulation in the meristematic regions. Treated plants stop growing soon after spray application. Chlorosis appears first in the newest leaves, and necrosis spreads from this point. In perennials, the herbicide is translocated into, and kills, underground storage organs which prevents regrowth. Chlorosis and tissue necrosis may not be apparent in some plant species until two weeks after application. Complete kill of plants may not occur for several weeks. Applications of **Arsenal** are rainfast one hour after treatment.

PRECAUTIONS FOR AVOIDING INJURY TO NON-TARGET PLANTS

Untreated trees can occasionally be affected by root uptake of **Arsenal** through movement into the top soil. Injury or

loss of desirable trees or other plants may result if **Arsenal® herbicide** is applied on or near desirable trees or other plants, on areas where their roots extend, or in locations where the treated soil may be washed or moved into contact with their roots.

MANAGING OFF-TARGET MOVEMENT

The following information is provided as general guidance for managing off-target movement. Specific use recommendations for **Arsenal** may differ depending on the application technique used and the vegetation management objective.

Spray Drift: Avoiding spray drift at the application site is the responsibility of the applicator. The interaction of many equipment-and-weather-related factors determine the potential for spray drift. The applicator and the grower are responsible for considering all these factors when making decisions.

Spray drift from applying this product may result in damage to sensitive plants adjacent to the treatment area. Only apply this product when the potential for drift to these and other adjacent sensitive areas (e.g. residential areas, bodies of water, known habitat for threatened or endangered species, or non-target crops) is minimal. Do not apply when the following conditions exist that increase the likelihood of spray drift from intended targets: high or gusty winds, high temperatures, low humidity, temperature inversions.

To minimize spray drift, the applicator should be familiar with and take into account the following drift reduction advisory information. Additional information may be available from state enforcement agencies or the Cooperative Extension on the application of this product.

The best drift management strategy and most effective way to reduce drift potential are to apply large droplets that provide sufficient coverage and control. Applying larger droplets reduces drift potential, but will not prevent drift if applications are made improperly, or under unfavorable environmental conditions (see Wind, Temperature and Humidity and Temperature Inversions).

Controlling Droplet Size:

- Volume - Use high flow rate nozzles to apply the highest practical spray volume. Nozzles with higher rated flows produce larger droplets.
- Pressure - **DO NOT** exceed the nozzle manufacturer's recommended pressures. For many nozzle types, lower pressure produces larger droplets. When higher flow rates are needed, use higher flow rate nozzles instead of increasing pressure.
- Number of Nozzles - use the minimum number of nozzles that provide uniform coverage.
- Nozzle Orientation - Orienting nozzles so that the spray is released parallel to the airstream produces larger droplets than other orientations and is recommended practice. Significant deflection from the horizontal will reduce droplet size and increase drift potential.
- Nozzle Type - Use a nozzle type that is designed for the intended application. With most nozzle types, narrower spray angles produce larger droplets. Consider using low-drift nozzles. Solid stream nozzles oriented straight back produce the largest droplets and the lowest drift. **DO NOT** use nozzles producing a mist droplet spray.

Application Height: Making applications at the lowest possible height (aircraft, ground driven spray boom) that is safe and practical reduces exposure of droplets to evaporation and wind.

Swath Adjustment: When applications are made with a crosswind, the swath will be displaced downwind. Therefore, on the up and downwind edges of the field, the applicator must compensate for this displacement by adjusting the path of the application equipment (e.g. aircraft, ground) upwind. Swath adjustment distance should increase with increasing drift potential (higher wind, smaller droplets, etc.).

Wind: Drift potential is lowest between wind speeds of 3-10 mph. However, many factors, including droplet size and equipment type, determine drift potential at any given speed. Application should be avoided below 3 mph due to variable wind direction and high inversion potential. NOTE: Local terrain can influence wind patterns. Every applicator should be familiar with local wind patterns and how they affect spray drift.

Temperature and Humidity: When making applications in low relative humidity, set up equipment to produce larger droplets to compensate for evaporation. Droplet evaporation is most severe when conditions are both hot and dry.

Temperature Inversions: Drift potential is high during a temperature inversion. Temperature inversions restrict vertical air mixing, which causes small suspended droplets to remain in a concentrated cloud, which can move in unpredictable directions due to the light variable winds common during inversions. Temperature inversions are characterized by increasing temperatures with altitude and are common on nights with limited cloud cover and light to no wind. They begin to form as the sun sets and often continue into the morning. Their presence can be indicated by ground fog; however, if fog is not present, inversions can also be identified by the movement of smoke from a ground source or an aircraft smoke generator. Smoke that layers and moves laterally in a concentrated cloud (under low wind conditions) indicates an inversion, while smoke that moves upward and rapidly dissipates indicates good vertical air mixing.

Wind Erosion: Avoid treating powdery dry or light sandy soils when conditions are favorable for wind erosion. Under these conditions, the soil surface should first be settled by rainfall or irrigation.

Aerial Application Methods and Equipment: Use 2 or more gallons of water per acre. The actual minimum spray volume per acre is determined by the spray equipment used. Use adequate spray volume to provide accurate and uniform distribution of spray particles over the treated area and to avoid spray drift.

Managing spray drift from aerial applications: Applicators must follow these requirements to avoid off-target drift movement: 1) boom length - the distance of the outermost nozzles on the boom must not exceed ¾ the length of the wingspan or rotor, 2) nozzle orientation - nozzles must always point backward parallel with the air stream and never be pointed downwards more than 45 degrees, and 3) application height - without compromising aircraft safety, applications should made at a height of 10 feet or less above the crop canopy or tallest plants. Applicators must follow the most restrictive use cautions to avoid drift hazards, including those found in this labeling as well as applicable state and local regulations and ordinances.

Ground Application (Broadcast): Use 5 or more gallons of water per acre. The actual minimum spray volume per acre is determined by the spray equipment used. Use adequate spray volume to provide accurate and uniform distribution of spray particles over the treated area and to avoid spray drift.

ADJUVANTS

Postemergence applications of Arsenal® herbicide require the addition of a spray adjuvant for optimum herbicide performance.

Nonionic Surfactants: Use a nonionic surfactant at the rate 0.25% v/v or higher (see manufacturer's label) of the spray solution (0.25% v/v is equivalent to 1 quart in 100 gallons). For best results, select a nonionic surfactant with a HLB (hydrophilic to lipophilic balance) ratio between 12 and 17 with at least 70% surfactant in the formulated product (alcohols, fatty acids, oils, ethylene glycol or diethylene glycol should not be considered as surfactants to meet the above requirements).

Methylated Seed Oils or Vegetable Oil Concentrates: Instead of a surfactant, a methylated seed oil or vegetable-based seed oil concentrate may be used at the rate of 1.5 to 2 pints per acre. When using spray volumes greater than 30 gallons per acre methylated seed oil or vegetable based seed oil concentrates should be mixed at a rate of 1% of the total spray volume or alternatively use a nonionic surfactant as described above. Research indicates that these oils may aid in **Arsenal** deposition and uptake by plants under moisture or temperature stress.

Silicone Based Surfactants: See manufacturer's label for specific rate recommendations. Silicone-based surfactants may reduce the surface tension of the spray droplet allowing greater spreading on the leaf surface as compared to conventional nonionic surfactants. However, some silicone-based surfactants may dry too quickly, limiting herbicide uptake.

Fertilizer/Surfactant Blends: Nitrogen based liquid fertilizers such as 28%N, 32%N, 10-34-0 or ammonium sulfate, may be added at the rate of 2 to 3 pints per acre in combination with the recommended rate of nonionic surfactant, methylated seed oil or vegetable/seed oil concentrate. The use of fertilizers in a tank mix without a nonionic surfactant, methylated seed oil or vegetable/seed oil concentrate is not recommended.

BRUSH CONTROL

AERIAL APPLICATIONS:
All precautions should be taken to minimize or eliminate spray drift. Fixed wing aircraft and helicopters can be used to apply **Arsenal**, however, **DO NOT** make applications by fixed wing aircraft unless appropriate buffer zones can be maintained to prevent spray drift out of the target area or, when treating open tracts of land, spray drift as a result of fixed wing aircraft application can be tolerated. Aerial equipment designed to minimize spray drift, such as a helicopter equipped with a Microfoil™ boom, Thru-Valve™ boom or raindrop nozzles, must be used and calibrated. Except when applying with a Microfoil boom, a drift control agent may be added at the recommended label rate. To avoid drift, applications should not be made during inversion conditions, when winds are gusty, or any other conditions which allow drift. Side trimming is not recommended with **Arsenal** unless death of treated tree can be tolerated.

Uniformly apply the recommended amount of **Arsenal** in 5 to 30 gallons of water per acre; include in the spray solution a nonionic surfactant or methylated seed oil or manufacturer's label rate of a silicone-based surfactant (See the Adjuvant section of this label for specific recommendations). A foam reducing agent may be added at the recommended label rate, if needed.

IMPORTANT: Thoroughly clean application equipment, including landing gear, immediately after use of this product. Prolonged exposure of this product to uncoated steel (except stainless steel) surfaces may result in corrosion and failure of the exposed part. The maintenance of an organic coating (paint) may prevent corrosion.

GROUND APPLICATIONS:
IMPORTANT: To minimize spray drift, select proper nozzles to avoid spraying a fine mist, use pressures less than 50 psi, and do not spray under gusty or windy conditions. Add a foam reducing agent, if needed, and a spray pattern indica-

tor, if desired, at the recommended label rates. Clean application equipment after using this product by thoroughly flushing with water.

When making applications to rights-of-way corridors where desirable tree roots may extend, use 1 to 3 pints of **Arsenal® herbicide** per acre in combination with recommended tank-mixes. It is not recommended to use rates higher than 3 pints per acre in these situations as injury or death of desirable trees may occur when their roots extend into treated zones.

Side Trimming:
DO NOT side trim with **Arsenal** unless severe injury or death of the treated tree can be tolerated. **Arsenal** is readily translocated and can result in death of the entire tree.

Low Volume:
Use equipment calibrated to deliver 5 to 20 gallons of spray solution per acre. To prepare the spray solution, thoroughly mix in water 0.5 to 5% **Arsenal** plus surfactant (See the Adjuvant section of this label for specific recommendations). A foam reducing agent may be applied at the recommended label rate, if needed. For control of difficult brush species (see "Weeds Controlled" section for relative susceptibility of weed species), use the higher concentrations of herbicide and/or spray volumes but do not apply more than 6 pints of **Arsenal** per acre. Excessive wetting of foliage is not recommended. See the Mixing Guide below for some suggested volumes of **Arsenal** and water.

SUGGESTED TANK-MIXES AND APPLICATION RATES*

Target Vegetation	Rate of ARSENAL herbicide	Tank Mix
Mixed hardwoods without elm, locust, or pine	1.0 - 1.5% by volume	Surfactant
Mixed hardwoods containing elm, locust, and pine	0.5 - 1.0% by volume	Accord® at 2 - 3% by volume plus surfactant
Mixed hardwoods with locust and pine but no elm	0.5 - 1.0% by volume	Krenite® at 2 - 5% by volume plus surfactant
Mixed hardwoods with locust and elm but no pine	0.5 - 1.0% by volume	Escort® at 2 oz./Acre or 2.3 grams/gal. plus surfactant

*Tank mixes with 2,4-D or products containing 2,4-D have resulted in reduced efficacy of **Arsenal**.

MIXING CHART

% Solution	Amount Arsenal per Gallon of Mix	Amount Arsenal per 4 Gallon Backpack
0.5 %	0.6 oz	2.6 oz
1.0%	1.3 oz	5.1 oz
2.0%	2.6 oz	10.2 oz
3.0%	3.8 oz	15.4 oz
5.0%	6.4 oz	25.6 oz

MEASURING CHART

128 ounces	=	1 gallon
16 ounces	=	1 pint
8 pints	=	1 gallon
4 quarts	=	1 gallon
2 pints	=	1 quart

Application Tips: For low volume, select proper nozzles to avoid over-application. Proper application is critical to ensure desirable results. Best results are achieved when the spray covers the crown and approximately 70 percent of the plant. The use of an even flat fan tip with a spray angle of 40 degrees or less will aid in proper deposition.

Recommended tip sizes include 4004E, or 1504E. For a straight stream and cone pattern, adjustable cone nozzles such as 5500 X3 or 5500 X4 may be used. Attaching a roll-over valve onto a Spraying Systems Model 30 gunjet or other similar spray guns allows for the use of both a flat fan and cone tips on the same gun.

Proper Spray Pattern: Moisten, but do not drench target vegetation causing spray solution to run off.

Low Volume with Backpacks:
For brush up to 4 feet tall, spray down on the crown, covering crown and penetrating approximately 70% of the plant.

For brush 4 to 8 feet tall, swipe the sides of target vegetation by directing spray to at least two sides of the plant in smooth vertical motions from the crown to the bottom. Make sure to cover the crown whenever possible.

For brush over 8 feet tall, lace sides of the brush by directing spray to at least two sides of the target in smooth zigzag motions from crown to bottom.

Low Volume with Hydraulic Handgun Application Equipment:
Use same technique as described above for Low Volume with Backpacks.

For broadcast applications, simulate a gentle rain near the top of target vegetation, allowing spray to contact the crown and penetrate the target foliage without falling to the understory. Herbicide spray solution which contacts the understory may result in severe injury or death of plants in the understory.

SPRAY SOLUTION MIXING GUIDE FOR LOW VOLUME APPLICATIONS

AMOUNT OF SPRAY SOLUTION BEING PREPARED	DESIRED CONCENTRATION (fluid volume)				
	0.5%	0.75%	1%	1.5%	5%
	(amount of Arsenal® herbicide to use)				
1 gallon	0.6 oz	0.9 oz	1.3 oz	1.9 oz	6.5 oz
3 gallons	1.9 oz	2.8 oz	3.8 oz	5.8 oz	1.2 pints
4 gallons	2.5 oz	3.8 oz	5.1 oz	7.7 oz	1.6 pints
5 gallons	3.2 oz	4.8 oz	6.5 oz	9.6 oz	2 pints
50 gallons	2 pints	3 pints	4 pints	6 pints	10 quarts
100 gallons	4 pints	6 pints	8 pints	6 quarts	5 gallons
2 tablespoons = 1 fluid ounce					

High Volumes:
For optimum performance when spraying medium to high density brush, use equipment calibrated to deliver up to 100 gallons of spray solution per acre (GPA). Spray solutions exceeding 100 GPA may result in excessive spray run-off, causing increased ground cover injury, and injury to desirable species. To prepare the spray solution, thoroughly mix **Arsenal** at a rate of 2 to 6 pints per acre (see Important section under Ground Applications) in water and add a surfactant (See Adjuvant section for specific recommendations and rates of surfactants). A foam reducing agent may be added at the recommended label rate, if needed. For control of difficult species (see "Weeds Controlled" section for relative susceptibility of weed species), use the higher concentrations of herbicide and/or spray volumes but do not apply more than 6 pints of **Arsenal** per acre. Uniformly cover the foliage of the vegetation to be controlled but do not apply to run-off. Excessive wetting of foliage is not recommended.

TANK MIXES FOR BRUSH CONTROL:

Arsenal® herbicide may be tank-mixed with Accord®, Roundup®, Krenite®, Escort®, Telar®, Tordon™ K, Garlon™ 3A, **Banvel®** and Vanquish® to provide control of **Arsenal** tolerant species.

Consult manufacturer's labels for specific rates and weeds controlled. Always follow the more restrictive label when making an application involving tank-mixes. Tank-mixing with 2,4-D or products which contain 2,4-D have resulted in reduced performance of **Arsenal**.

INVERT EMULSIONS:

Arsenal can be applied as an invert emulsion. The spray solution results in an invert (water-in-oil) spray emulsion designed to minimize spray drift and spray run-off, resulting in more herbicide on the target foliage. The spray emulsion may be formed in a single tank (batch mixing) or injected (in-line mixing). Consult the invert chemical label for proper mixing directions.

CUT STUBBLE:

Arsenal can be applied within 2 weeks after mechanical mowing or cutting of brush. To suppress or control resprouting, uniformly apply a spray solution of **Arsenal** at the rate of 1 to 2 pints per acre to the cut area. **Arsenal** may be tank-mixed with Tordon K to aid in control or suppression of brush. The addition of 5% (v/v) or more of a penetrating agent can aid in uptake through the bark or exposed roots.

Cut stubble applications are made to the soil and cut brush stumps. This type of application may increase ground cover injury. However, vegetation will recover. Making applications of **Arsenal** directly to the soil can increase potential root uptake causing injury or death of desirable trees.

Efficacy can be increased and root uptake by desirable vegetation can be decreased if the brush is allowed to regrow and the foliage is treated. See the Brush Control section of this label.

STUMP AND CUT STEM TREATMENTS:

Arsenal may be used to control undesirable woody vegetation on noncropland by applying the **Arsenal** solution to the cambium area of freshly-cut stump surfaces or to fresh cuts on the stem of the target woody vegetation. Applications can be made at any time of the year except during periods of heavy sap flow in the spring. Do not overapply solution causing run-off or puddling.

Mixing: Arsenal may be mixed as either a concentrated or dilute solution for stump and cut stem treatments. The dilute solution may be used for applications to the surface of the stump or to cuts on the stem of the target woody vegetation. Concentrated solutions may be used for applications to cuts on the stem. Use of the concentrated solution permits application to fewer cuts on the stem, especially for large diameter trees. Follow the application instructions to determine proper application techniques for each type of solution.

To prepare a dilute solution, mix 8 to 12 fluid ounces of **Arsenal** with one gallon of water. If temperatures are such that freezing of the spray mixture may occur, antifreeze (ethylene glycol) may be used according to manufacturer's label to prevent freezing. The use of a surfactant or penetrating agent may improve uptake through partially callused cambiums. To prepare a concentrated solution, mix 2 quarts of **Arsenal** with no more than 1 quart of water.

APPLICATION WITH DILUTE SOLUTIONS:

For cut stump treatments: Spray or brush the solution onto the cambium area of the freshly cut stump surface. Insure that the solution thoroughly wets the entire cambium area (the wood next to the bark of the stump).

For tree injection treatments: Using standard injection equipment, apply 1 milliliter of solution at each injection site around the tree with no more than one inch intervals between cut edges. Insure that the injector completely penetrates the bark at each injection site.

For frill or girdle treatments: Using a hatchet, machete, or similar device, make cuts through the bark at intervals around the tree with no more than two inch intervals between cut edges. Spray or brush the solution into each cut until thoroughly wet.

APPLICATION WITH CONCENTRATED SOLUTIONS:

For tree injection treatments: Using standard injection equipment, apply 1 milliliter of solution at each injection site. Make at least one injection cut for every 3 inches of Diameter at Breast Height (DBH) on the target tree. For example, a 3 inch DBH tree will receive 1 injection cut and a 6 inch DBH tree will receive 2 injection cuts. On trees requiring more than one injection site place the injection cuts at approximately equal intervals around the tree.

For frill or girdle treatments: Using a hatchet, machete, or similar device, make cuts through the bark at approximately equal intervals around the tree. Make at least one cut for every 3 inches of DBH on the target tree. For example, a 3 inch DBH tree will receive 1 cut and a 6 inch DBH tree will receive 2 cuts. Spray or brush the solution into each cut until thoroughly wet.

NOTE: Injury may occur to desirable woody plants if the shoots extend from the same root system or their root systems are grafted to those of the treated tree.

FOR CONTROL OF UNDESIRABLE WEEDS UNDER PAVED SURFACES

Arsenal can be used under asphalt, pond liners and other paved areas, ONLY in industrial sites or where the pave-

ment has a suitable barrier along the perimeter that prevents encroachment of roots of desirable plants.

Arsenal® herbicide should be used only where the area to be treated has been prepared according to good construction practices. If rhizomes, stolons, tubers or other vegetative plant parts are present in the site, they should be removed by scalping with a grader blade to a depth sufficient to insure their complete removal.

IMPORTANT: Paving should follow **Arsenal** applications as soon as possible. **DO NOT** apply where the chemical may contact the roots of desirable trees or other plants.

The product is not recommended for use under pavement on residential properties such as driveways or parking lots, nor is it recommended for use in recreational areas such as under bike or jogging paths, golf cart paths, or tennis courts, or where landscape plantings could be anticipated. Injury or death of desirable plants may result if this product is applied where roots are present or where they may extend into the treated area. Roots of trees and shrubs may extend a considerable distance beyond the branch extremities or so-called drip line.

APPLICATION DIRECTIONS FOR PAVED SURFACES:
Applications should be made to the soil surface only when final grade is established. Do not move soil following **Arsenal** application.

Apply **Arsenal** in sufficient water (at least 100 gal. per acre) to ensure thorough and uniform wetting of the soil surface, including the shoulder areas. Add **Arsenal** at a rate of 6 pints per acre (2.2 fluid ounce per 1000 square feet) to clean water in the spray tank during the filling operation. Agitate before spraying.

If the soil is not moist prior to treatment, incorporation of **Arsenal** is needed for herbicide activation. **Arsenal** can be incorporated into the soil to a depth of 4 to 6 inches using a rototiller or disc. Rainfall or irrigation of 1 inch will also provide uniform incorporation. Do not allow treated soil to wash or move into untreated areas.

FOR CONTROL OF UNDESIRABLE WEEDS IN UNIMPROVED BERMUDAGRASS AND BAHIAGRASS

Arsenal may be used on unimproved bermudagrass and bahiagrass turf such as roadsides, utility rights-of-way and other non-cropland industrial sites. The application of **Arsenal** on established common and coastal bermudagrass and bahiagrass provides control of labeled broadleaf and grass weeds. Competition from these weeds is eliminated, releasing the bermudagrass and bahiagrass. Treatment of bermudagrass with **Arsenal** results in a compacted growth habit and seedhead inhibition.

Uniformly apply with properly calibrated ground equipment using at least 10 gallons of water per acre with a spray pressure 20 to 50 psi.

IMPORTANT: Temporary yellowing of grass may occur when treatment is made after growth commences. **DO NOT** add surfactant in excess of the recommended rate (1 oz. per 25 gallons of spray solution). **DO NOT** APPLY to grass during its first growing season. **DO NOT** APPLY to grass that is under stress from drought, disease, insects, or other causes.

DOSAGE RATES AND TIMING:
Bermudagrass - Apply **Arsenal** at 6 to 12 oz. per acre when the bermudagrass is dormant. Apply **Arsenal** at 6 to 8 oz. per acre after the bermudagrass has reached full green-up. Applications made during green-up will delay green-up. Include a surfactant in the spray solution (See IMPORTANT statement above).

For additional pre-emergence control of annual grasses and small seeded broadleaf weeds, add **Pendulum® herbicide** at the rate of 3.3 to 6.6 lbs. per acre. Consult the **Pendulum** label for weeds controlled and for other use directions and precautions.

For control of johnsongrass in bermudagrass turf, apply **Arsenal** at 8 oz. per acre plus Roundup® herbicide at 12 oz. per acre plus surfactant. For additional control of broadleaves and vines, Garlon™ 3A may be added to the above mix at the rate of 1-2 pints per acre. Observe all precautions and restrictions on the Garlon 3A and Roundup label.

Bahiagrass - Apply **Arsenal** at 4 to 8 oz. per acre when the bahiagrass is dormant or after the grass has initiated green-up but has not exceeded 25% green-up. Include in the spray solution a surfactant (See Adjuvant section for specific recommendations on surfactants).

WEEDS CONTROLLED:

Bedstraw (*Galium* spp.)
Bishopweed (*Ptilimnium capillaceum*)
Buttercup (*Ranunculus parviflorus*)
Carolina geranium (*Geranium carolinianum*)
Fescue (*Festuca* spp.)
Foxtail (*Setaria* spp.)
Little barley (*Hordeum pusillum*)
Seedling Johnsongrass (*Sorghum halepense*)
Wild carrot (*Daucus carota*)
White clover (*Trifolium repens*)
Yellow woodsorrel (*Oxalis stricta*)

GRASS GROWTH AND SEEDHEAD SUPPRESSION

Arsenal may be used to suppress growth and seedhead development of certain turfgrass in unimproved areas. When applied to desirable turf, **Arsenal** may result in temporary turf damage and/or discoloration. Effects to the desirable turf may vary with environmental conditions. For optimum performance, application should be made prior to culm elongation. Applications may be made before or after mowing. If applied prior to mowing, allow at least three

days of active growth before mowing. If following a mowing, allow sufficient time for the grasses to recover before applying this product or injury may be amplified.

DO NOT APPLY to turf under stress (drought, cold, insect damaged, etc.) or severe injury or death may occur.

Bermudagrass - Apply **Arsenal® herbicide** at 6 to 8 oz. per acre from early green-up to prior to seed head initiation. **DO NOT** add a surfactant for this application.

Cool Season Unimproved Turf - Apply **Arsenal** at 2 oz. per acre plus 0.25% nonionic surfactant. For increased suppression, **Arsenal** may be tank-mixed with such products as Campaign® (24 oz. per acre) or Embark® (8 oz. per acre).

Tank-mixes may increase injury to desired turf. Consult each product label for recommended turf species and other use directions and precautions. Tank mixes with 2,4-D or products containing 2,4-D may decrease the effectiveness of **Arsenal**.

TOTAL VEGETATION CONTROL WHERE BAREGROUND IS DESIRED

Arsenal is an effective herbicide for preemergence or postemergence control of many annual and perennial broadleaf and grass weeds where bareground is desired. **Arsenal** is particularly effective on hard-to-control perennial grasses. **Arsenal** at 1.5 to 6 pints per acre can be used alone or in tank-mix with Roundup® , Finale®, MSMA, Diuron, Karmex®, **Pendulum®**, **Arsenal**, Simazine, **Banvel®**, Vanquish®, or Oust® herbicides. The degree and duration of control are dependent on the rate of **Arsenal** used, tank-mix partner, the volume of carrier, soil texture, rainfall and other conditions.

Consult manufacturer's labels for specific rates and weeds controlled. Always follow the more restrictive label when making an application involving tank-mixes.

Consult manufacturer's labels for specific rates and weeds controlled. Always follow the more restrictive label when making an application involving tank-mixes.

TANK-MIX RECOMMENDATIONS FOR BAREGROUND:

Herbicide Rates per Acre*

Arsenal rate in pints	**Pendulum®** WDG in lbs.	**Pendulum** 3.3 EC in Quarts	Diuron in lbs. a.i.
1.5 - 3	6.6	4.8	4 - 6
2 - 4	6.6	4.8	6 - 10
3 - 6	6.6	4.8	8 - 12

* Use higher rates for fall applications and in areas that have not been previously treated or that feature heavy infestations.

Applications of **Arsenal** may be made anytime of the year. Use equipment calibrated to deliver desired gallons per acre spray volume and uniformly distribute the spray pattern over the treated area.

Postemergence Applications: Always use a spray adjuvant (See Adjuvant section of this label) when making a postemergence application. For optimum performance on tough to control annual grasses, applications should be made at a total volume of 100 gallons per acre or less. For quicker burndown or brown-out of target weeds, **Arsenal** may be tank-mixed with products such as Roundup, Finale, or MSMA. Tank mixes with 2,4-D or products containing 2,4-D have reduced performance of **Arsenal**. Always follow the more restrictive label when tank-mixing.

Spot Treatments: Arsenal may be used as a follow-up treatment to control escapes or weed encroachment in a bareground situation. To prepare the spray solution, thoroughly mix in each gallon of water 0.5 to 5% **Arsenal** plus an adjuvant. For increased burndown, include Roundup, Finale, MSMA, or similar products. For added residual weed control or to increase the weed spectrum add **Pendulum®** or Diuron. Always follow the more restrictive label when tank-mixing.

FOR SPOT TREATMENT WEED CONTROL IN GRASS PASTURE AND RANGELAND

For the control of undesirable vegetation in grass pasture and rangeland, **Arsenal** may be applied as a spot treatment at a rate of 2 to 48 fluid oz of product per treated acre using any of the described ground application methods. Spot applications to grass pasture and rangeland may not exceed more than one tenth of the area to be grazed or cut for hay. See appropriate sections of this label for specific use directions for the application method and vegetation control desired. **DO NOT** apply more than 48 fluid oz per acre per year.

Grazing and haying restrictions: There are no grazing restrictions following **Arsenal** application. **DO NOT** cut forage grass for hay for seven days after **Arsenal** application.

GUIDELINES FOR RANGELAND USE

Arsenal may be applied to rangeland for the control of undesirable vegetation in order to achieve one or more of the following vegetation management objectives:

1. The control of undesirable (non-native, invasive and noxious) plant species
2. The control of undesirable vegetation in order to aid in the establishment of desirable rangeland plant species.
3. The control of undesirable vegetation in order to aid in the establishment of desirable rangeland vegetation following a fire.
4. The control of undesirable vegetation for purposes of wildfire fuel reduction.

5. The release of existing desirable rangeland plant communities from the competitive pressure of undesirable plant species.
6. The control of undesirable vegetation for purposes of wildlife habitat improvement.

To ensure the protection of threatened and endangered plants when applying **Arsenal® herbicide** to rangeland:

1. Federal agencies must follow NEPA regulations to ensure protection of threatened and endangered plants.
2. State agencies must work with the Fish and Wildlife Service or the Service's designated state conservation agency to ensure protection of threatened and endangered plants.
3. Other organizations or individuals must operate under a Habitat Conservation Plan if threatened or endangered plants are known to be present on the land to be treated.

Please see the appropriate section(s) of this label for specific use directions for the desired rangeland vegetation management objective.

Arsenal should only be applied to a given rangeland acre as specific weed problems arise. Long term control of undesirable weed species ultimately depends on the successful use of land management practices that promote the growth and sustainability of desirable rangeland plant species.

ROTATIONAL CROP GUIDELINE

Rotational crops may be planted twelve months after applying **Arsenal** at the recommended pasture and rangeland rate. Following twelve months after a **Arsenal** application, and before planting any crop, a successful field bioassay must be completed. The field bioassay consists of a test strip of the intended rotational crop planted in the previously treated area in the grass pasture/rangeland and grown to maturity. The test strip should include low areas and knolls, and include variations in soil type and pH within the treated area. If no crop injury is evident in the test strip, the intended rotational crop may be planted the following year.

Use of **Arsenal** in accordance with label directions is expected to result in normal growth of rotational crops in most situations; however, various environmental and agronomic factors make it impossible to eliminate all risks associated with the use of this product and, therefore, rotational crop injury is always possible.

WEEDS CONTROLLED BY ARSENAL

Arsenal will provide preemergence or postemergence control with residual control of the following target vegetation species at the rates listed. Residual control refers to control of newly germinating seedlings in both annuals and perennials. In general, annual weeds may be controlled by preemergence or postemergence applications of **Arsenal**. **For established biennials and perennials, postemergence applications of Arsenal are recommended.** The rates shown below pertain to broadcast applications and indicate the relative sensitivity of these weeds. The relative sensitivity should be referenced when preparing low volume spray solutions (see "Low Volume" section of "Ground Applications"); low volume applications may provide control of the target species with less **Arsenal** per acre than is shown for the broadcast treatments. **Arsenal** should be used only in accordance with the recommendations on this label and the leaflet label.

Resistant Biotypes: Naturally occurring biotypes (a plant within a given species that has a slightly different, but distinct genetic makeup from other plants of the same species) of some weeds listed on this label may not be effectively controlled by this and/or other herbicides (Oust®) with the ALS/AHAS enzyme inhibiting mode of action. If naturally occurring ALS/AHAS resistant biotypes are present in an area, **Arsenal** should be tank-mixed or applied sequentially with an appropriate registered herbicide having a different mode of action to ensure control.

GRASSES

Apply 2-3 pints per acre[1]

COMMON NAME	SPECIES	GROWTH HABIT[2]
Annual bluegrass	(*Poa annua*)	A
Broadleaf signalgrass	(*Brachiaria platyphylla*)	A
Canada bluegrass	(*Poa compressa*)	P
Downy brome	(*Bromus tectorum*)	A
Fescue	(*Festuca* spp.)	A/P
Foxtail	(*Setaria* spp.)	A
Italian ryegrass	(*Lolium multiflorum*)	A
Johnsongrass	(*Sorghum halepense*)	P
Kentucky bluegrass	(*Poa pratensis*)	P
Lovegrass	(*Eragrostis* spp.)	A/P
Orchardgrass	(*Dactylis glomerata*)	P
Paragrass	(*Brachiaria mutica*)	P
Quackgrass	(*Agropyron repens*)	P
Sandbur	(*Cenchrus* spp.)	A
Sand dropseed	(*Sporobulus cryptandrus*)	A
Smooth brome	(*Bromus inermis*)	P
Vaseygrass	(*Paspalum urvillei*)	P
Wild oats	(*Avena fatua*)	A
Witchgrass	(*Panicum capillare*)	A

Apply 3-4 pints per acre[1]

Barnyardgrass[3]	(*Echinochloa crus-gali*)	A
Beardgrass	(*Andropogon* spp.)	P
Bluegrass, Annual[3]	(*Poa annua*)	A
Cheat	(*Bromus secalinus*)	A
Crabgrass	(*Digitaria* spp.)	A
Crowfootgrass[3]	(*Dactyloctenium aegyptium*)	A
Fall panicum	(*Panicum dichotomiflorum*)	A
Giant Reed	(*Arundo donax*)	A
Goosegrass	(*Eleusine indica*)	A
Itchgrass[3]	(*Rottboellia exaltata*)	A
Junglerice[3]	(*Echinochloa colonum*)	A
Lovegrass[3]	(*Eragrostis* spp.)	A
Maidencane	(*Panicum hemitomon*)	A
Panicum, Browntop[3]	(*Panicum fasciculatum*)	A
Panicum, Texas[3]	(*Panicum texanum*)	A
Prairie threeawn	(*Aristida oligantha*)	P
Reed canarygrass	(*Phalaris arundinacea*)	P
Sandbur, Field[3]	(*Cenchrus incertus*)	A
Signalgrass[3]	(*Brachiaria* spp.)	A
Torpedograss	(*Panicum repens*)	P
Wild barley	(*Hordeum* spp.)	A
Wooly Cupgrass[3]	(*Eriochloa villosa*)	A

Apply 4-6 pints per acre[1]

Bahiagrass	(*Paspalum notatum*)	P
Bermudagrass[4]	(*Cynodon dactylon*)	P

GRASSES (*continued*)

Apply 4-6 pints per acre[1]

COMMON NAME	SPECIES	GROWTH HABIT[2]
Big bluestem	(*Andropogon gerardii*)	P
Cattail	(*Typha* spp.)	P
Cogongrass	(*Imperata cylindrica*)	P
Dallisgrass	(*Paspalum dilatatum*)	P
Feathertop	(*Pennisetum villosum*)	P
Guineagrass	(*Panicum maximum*)	P
Phragmites	(*Phragmites australis*)	P
Prairie cordgrass	(*Spartina pectinata*)	P
Saltgrass[4]	(*Distichlis stricta*)	P
Sand dropseed	(*Sporobolus cryptandrus*)	P
Sprangletop[3]	(*Leptochloa* spp.)	A
Timothy	(*Phleum pratense*)	P
Wirestem muhly	(*Muhlenbergia frondosa*)	P

BROADLEAF WEEDS

Apply 2-3 pints per acre[1]

Alligatorweed	(*Alternanthera philoxeroides*)	A/P
Burdock	(*Arctium* spp.)	B
Carpetweed	(*Mollugo verticillata*)	A
Carolina geranium	(*Geranium carolinianum*)	A
Clover	(*Trifolium* spp.)	A/P
Common chickweed	(*Stellaria media*)	A
Common ragweed	(*Ambrosia artemisiifolia*)	A
Dandelion	(*Taraxacum officinale*)	P
Dogfennel	(*Eupatorium capillifolium*)	A
Filaree	(*Erodium* spp.)	A
Fleabane	(*Erigeron* spp.)	A
Hoary vervain	(*Verbena stricta*)	P
Indian mustard	(*Brassica juncea*)	A
Kochia[5]	(*Kochia scoparia*)	A
Lambsquarters	(*Chenopodium album*)	A
Lespedeza	(*Lespedeza* spp.)	P
Miners lettuce	(*Montia perfoliata*)	A
Mullein	(*Verbascum* spp.)	B
Nettleleaf goosefoot	(*Chenopodium murale*)	A
Oxeye daisy	(*Chrysanthemum leucanthemum*)	P
Pepperweed	(*Lepidium* spp.)	A
Pigweed	(*Amaranthus* spp.)	A
Puncturevine	(*Tribulus terrestris*)	A
Russian thistle	(*Salsola kali*)	A
Smartweed	(*Polygonum* spp.)	A/P
Sorrell	(*Rumex* spp.)	P
Sunflower	(*Helianthus* spp.)	A
Sweet clover	(*Melilotus* spp.)	A/B
Tansymustard	(*Descurainia pinnata*)	A
Western ragweed	(*Ambrosia psilostachya*)	P
Wild carrot	(*Daucus carota*)	B

BROADLEAF WEEDS (*continued*)

Apply 2-3 pints per acre[1]

COMMON NAME	SPECIES	GROWTH HABIT[2]
Wild lettuce	(*Lactuca* spp.)	A/B
Wild parsnip	(*Pastinaca sativa*)	B
Wild turnip	(*Brassica campestris*)	B
Woollyleaf bursage	(*Franseria tomentosa*)	P
Yellow woodsorrel	(*Oxalis stricta*)	P

Apply 3-4 pints per acre[1]

Broom snakeweed[6]	(*Gutierrezia sarothrae*)	P
Bull thistle	(*Cirsium vulgare*)	B
Burclover[3]	(*Medicago* spp.)	A
Chickweed, Mouseear[5]	(*Cerastium vulgatum*)	A
Clover, Hop[3]	(*Trifolium procumbens*)	A
Cocklebur	(*Xanthium strumarium*)	A
Cudweed[3]	(*Gnaphalium* spp.)	A
Desert Camelthorn	(*Alhagi pseudalhagi*)	P
Diffuse knapweed	(*Centaurea diffusa*)	A
Dock	(*Rumex* spp.)	P
Fiddleneck[3]	(*Amsinckia intermedia*)	A
Goldenrod	(*Solidago* spp.)	P
Henbit[3]	(*Lamium aplexicaule*)	A
Knotweed, prostrate[3]	(*Polygonum aviculare*)	A/P
Pokeweed	(*Phytolacca americana*)	P
Purple loosestrife[5]	(*Lythrum salicaria*)	P
Purslane	(*Portulaca* spp.)	A
Pusley, Florida[3]	(*Richardia scabra*)	A
Rocket, London[3]	(*Sisymbrium irio*)	A
Rush skeletonweed[6]	(*Chondrilla juncea*)	B
Saltbush	(*Atriplex* spp.)	A
Shepherd's-purse[3]	(*Capsella bursa-pastoris*)	A
Spurge, Annual[3]	(*Euphorbia* spp.)	A
Stinging nettle[5]	(*Urtica dioica*)	P
Velvetleaf[3]	(*Abutilon theophrasti*)	A
Yellow starthistle	(*Centaurea solstitialis*)	A

Apply 4-6 pints per acre[1]

Arrowwood	(*Pluchea sericea*)	A
Canada thistle	(*Cirsium arvense*)	P
Giant ragweed	(*Ambrosia trifida*)	A
Grey rabbitbrush	(*Chrysothamnus nauseosus*)	P
Japanese bamboo/knotweed	(*Polygonum cuspidatum*)	P
Little mallow	(*Malva parviflora*)	B
Milkweed	(*Asclepias* spp.)	P
Primrose	(*Oenothera kunthiana*)	P
Russian knapweed	(*Centaurea repens*)	P
Silverleaf nightshade	(*Solanum elaeagnifolium*)	P
Sowthistle	(*Sonchus* spp.)	A
Texas thistle	(*Cirsium texanum*)	P

VINES AND BRAMBLES

Apply 1 pint per acre

Field bindweed	(*Convolvulus arvensis*)	P
Hedge bindweed	(*Calystegia sepium*)	A

Apply 2-3 pints per acre[1]

Wild buckwheat	(*Polygonum convolvulus*)	P

Apply 3-4 pints per acre[1]

Greenbriar		(*Smilax* spp.)	P
Honeysuckle		(*Lonicera* spp.)	P
Morningglory		(*Ipomoea* spp.)	A/P
Poison ivy		(*Rhus radicans*)	P
Redvine		(*Brunnichia cirrhosa*)	P
Wild rose		(*Rosa* spp.)	P
Including:	Multiflora rose	(*Rosa multiflora*)	P
	Macartney rose	(*Rosa bractreata*)	P

Apply 4-6 pints per acre[1]

Kudzu[4]	(*Pueraria lobata*)	P
Trumpetcreeper	(*Campsis radicans*)	P
Virginia creeper	(*Parthenocissus quinquefolia*)	P
Wild grape	(*Vitis* spp.)	P

BRUSH SPECIES

Apply 4-6 pints per acre[1]

American beech	(*Fagus grandifolia*)	P
Ash	(*Fraxinus* spp.)	P
Bald cypress	(*Taxodium distichum*)	P
Bigleaf Maple	(*Acer macrophylum*)	P
Black Locust[7]	(*Robinia pseudoacacia*)	P
Blackgum	(*Nyssa sylvatica*)	P
Boxelder	(*Acer negundo*)	P
Brazilian peppertree[8]	(*Schinus terebinthifolius*)	P
Cherry	(*Prunus* spp.)	P
Chinaberry	(*Melia azadarach*)	P
Chinese tallow-tree	(*Sapium sebiferum*)	P
Dogwood	(*Cornus* spp.)	P
Elm[9]	(*Ulmus* spp.)	P
Hawthorn	(*Crataegus* spp.)	P
Hickory	(*Carya* spp.)	P
Honeylocust[10]	(*Gleditsia triacanthos*)	P
Maple	(*Acer* spp.)	P
Melaleuca[6]	(*Melaleuca quiquenervia*)	P
Mulberry	(*Morus* spp.)	P
Oak	(*Quercus* spp.)	P
Persimmon	(*Diospyros virginiana*)	P
Pine[11]	(*Pinus* spp.)	P

BRUSH SPECIES (*continued*)

Apply 4-6 pints per acre[1]

COMMON NAME	SPECIES	GROWTH HABIT[2]
Poplar	(*Populus* spp.)	P
Privet	(*Ligustrum vulgare*)	P
Red Alder	(*Alnus rubra*)	P
Red Maple	(*Acer rubrum*)	P
Russian Olive	(*Eleagnus angustifolia*)	P
Saltcedar	(*Tamarix ramosissima*)	P
Sassafras	(*Sassafras albidum*)	P
Sourwood	(*Oxydendrum arboreum*)	P
Sumac	(*Rhus* spp.)	P
Sweetgum	(*Liquidambar styraciflua*)	P
Willow	(*Salix* spp.)	P
Yellow poplar	(*Liriodendron tulipifera*)	P

[1] The higher rates should be used where heavy or well established infestations occur.
[2] Growth Habit - A = Annual, B = Biennial, P = Perennial
[3] For preemergence control, tank-mix with **Pendulum®**.
[4] Use a minimum of 75 GPA - Control of established stands may require repeat applications.
[5] For preemergence control, tank-mix with **Pendulum** or Karmex®.
[6] For best results early postemergence applications are required.
[7] Tank-mix with Roundup®, Accord®, Escort®, Krenite®, Garlon™ 3A, or Tordon™ K.
[8] See supplemental labeling for Florida.
[9] Tank-mix with Roundup, Accord, or Escort.
[10] Tank-mix with Roundup, Accord, Garlon 3A, or Tordon K.
[11] Tank-mix with Accord, Roundup, Garlon 3A, Tordon K, or Krenite.

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Agricultural Products
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Research Triangle Park, NC 27709

BASF
The Chemical Company

Section III

NSTAR's Best Management Practices for Vegetation Maintenance in Priority Habitat

Section III
NSTAR's
Best Management Practices
For Vegetation Maintenance
In Priority Habitats

This Section contains:

- The list of Best Management Practices that NSTAR vegetation crews use when maintaining vegetation in Priority Habitat areas.
- The letter from Natural Heritage defining requirements for NSTAR's 2005 vegetation maintenance on NSTAR's Rights-of-Way.
- A copy of NSTAR's Turtle Collection Permit for moving turtles on NSTAR's Rights-of-Way.
- A copy of the training materials provided by Natural Heritage for identifying and moving turtles on NSTAR's Rights-of-Way.

NSTAR's Best Management Practices

- All woody brush shall be removed (cut) in the "wire zone" whereas desirable woody vegetation; i.e., low growing species, shall be left intact to the fullest extent possible outside of the "wire zone".

- No mowing activities will occur between April 17 to May 29.

- In wetlands, undesirable woody vegetation shall be hand cut.

- No cut wood will be left within standing water. Cut wood will be windrowed outside of wet areas.

- Woody vegetation requiring mowing will be done with equipment that will not leave ruts. If for any reason ruts are left in a wetland or a buffer zone to a wetland, the ruts will be repaired by hand upon completion of the work.

- All equipment shall be clean and free from all leaks and will not be refueled in or near wetlands. Contractors will have spill kits and will notify NSTAR immediately of all spills

- All herbicide spraying will be done by Low pressure back pack foliar treatment.

NSTAR's Best Management Practices (Continued)

- In Priority Habitats where there are turtles during active seasons, we will move turtles out of the way in advance of heavy equipment according to our annual collection permit and training. Training, as prepared and/or delivered by Natural Heritage, will be given annually to crews who will be responsible for this activity.

- Scrub Oak located in Priority Habitat shall not be cut or herbicided except within a 30 foot diameter around electrical structures or within an existing vehicle access road.

2005 Letter from Natural Heritage

for

NSTAR's Vegetation Maintenance

Commonwealth of Massachusetts

Division of Fisheries & Wildlife

MassWildlife

Wayne F. MacCallum. *Director*

April 14, 2005

Sharon Cushing, Environmental Engineer
NSTAR
One NSTAR Way, NE250
Westwood, MA 02090

RE: Applicant: NSTAR 2005 Mechanical Vegetation Management Lists North & South
NHESP File No. 05-17613

Dear Ms. Cushing:

The Natural Heritage and Endangered Species Program (NHESP) of the Massachusetts Division of Fisheries and Wildlife has reviewed the above-listed vegetation management lists (attached to this letter) and would like to offer the following comments regarding state-listed rare species.

In accord with earlier discussions you have had with Tim Simmons of our office, and in order to avoid a "take" of state-listed rare species, protected pursuant to the provisions of the Massachusetts Endangered Species Act Regulations, the following procedures shall be implemented within portions of the Right-of-Ways (ROW) mapped as Estimated Habitat of Rare Wildlife or Priority Habitat of Rare Species (*MA Natural Heritage Atlas, 11th Edition*):

1. No cutting or herbiciding shall occur within wetland Resource Areas, even if the wetlands are seasonally dry. If vegetation management within a wetland is deemed to be necessary, then the NHESP will be contacted to discuss special provisions that may be needed to protect rare species and their habitats. In such cases, no work within a wetland shall be initiated until the NHESP provides written approval.
2. Scrub oak shall not be cut or herbicided except:
    a. within a 30-foot diameter area surrounding electrical towers and pole structures
    b. within an existing vehicle access road
3. No herbicides shall be used, other than:
    a. the exception noted in paragraph 2, above
    b. the spot application of herbicide to individual tree saplings (not within wetland Resource Area)
4. Areas dominated by low-growing native shrub species (e.g., lowbush blueberry, huckleberry, sheep laurel, sweet-fern shall not be cut or herbicided).
5. A subset of Priority/Estimated Habitats are mapped, in part, for the presence of state-listed rare turtle species (Blanding's Turtle, Wood Turtle, Eastern Box Turtle, Spotted Turtle, and Northern Red-bellied Cooter) (see attached table). Within this subset of Priority/Estimated habitats, a qualified turtle monitor who possesses a valid scientific collecting permit, and who is familiar with the identification of native turtles, shall walk in front of mowers and other heavy equipment looking for turtles and moving them away from the path of such equipment. Any state-listed turtles that are encountered shall be photographed and reported to the NHESP on Rare Animal Observation Forms (available at www.nhesp.org).

6. Prior to the initiation of work within each ROW, the NHESP shall be provided in writing with the following information: anticipated start and end date, anticipated start location, name, phone number, and email address of the project manager responsible for the on the ground supervision of work crews. This will facilitate site visits by NHESP personnel.

The NHESP will be providing a separate letter regarding proposed herbiciding sites in the near future.

Although the management measures listed above are only required for areas within Priority and Estimated Habitat, we encourage NSTAR to consider a similar management approach elsewhere (e.g., within ROW areas near mapped rare species habitats). We appreciate the measures that NSTAR is taking to manage and protect rare species habitats within ROW's, and we look forward to working with you to further streamline the rare species review process for ROW vegetation management. If you have any questions or if you need further information regarding this letter, please contact Jon Regosin, Ph.D. at (508) 792-7270 ext. 316.

Sincerely,

Thomas W. French

Thomas W. French, Ph.D.
Assistant Director

cc: Tim Simmons, NHESP
Paul Somers, NHESP
Dave Szczebak, NHESP

Table 1. List of Priority Habitats supporting state-listed rare turtles within ROW's included in the 2005 Vegetation Management List provided by NSTAR

PH 446
PH 460
PH 957
PH 1019
PH 1062
PH 1239
PH 1470
PH 1545
PH 1584
PH 1640
PH 969

NSTAR's 2005 Turtle Collection Permit

&

Natural Heritage Training Materials For Identifying and Moving Turtles

Commonwealth of Massachusetts

Division of Fisheries & Wildlife

Wayne F. MacCallum, Director

Scientific Collection Permit

VALID
2005

NSTAR

1 NSTAR Way NE 250
Westwood, MA 02090-9230

DATE: 9/19/2005
PERMIT# : 010-05WR
NHESP Tracking # : 05-17613

Subpermitee(s): Sharon Cushing, Beverly Shultz, Kevin McCune, Paul Sellers, William Hayes, Chris Fallon, Darrin Dion, Christopher Moultroup, and crews of Barnes Tree Service.

Is (are) hereby authorized, in accordance with the provisions of Section 4, Chapter 131 and 131A of the Massachusetts General Laws, to remove from the wild within the Commonwealth, subject to conditions set forth below, the following species and numbers:

MAY HAND CAPTURE ALL TURTLES, INCLUDING STATE-LISTED TURTLE SPECIES, ENCOUNTERED BY VISUALLY INSPECTING THE GROUND WITHIN ALL NSTAR RIGHT-OF-WAYS, AND IMMEDIATELY RELOCATE TURTLES OUTSIDE OF THE WORK AREA. THE RELOCATION OF TURTLES SHALL BE IN ACCORDANCE WITH PROCEDURES OUTLINED IN THE OPERATION, MAINTENANCE, AND VEGETATION MANAGEMENT OF EXISTING RIGHT-OF-WAYS IN STATE-LISTED TURTLE PRIORITY HABITAT (DATED 8/25/05). RARE SPECIES OBSERVATION FORMS MUST BE SUBMITTED FOR ALL STATE-LISTED RARE SPECIES ENCOUNTERED. FOR EACH STATE-LISTED RARE SPECIES, THE FIRST OBSERVATION OF THAT SPECIES MUST BE REPORTED ON THE APPROPRIATE FORM WITHIN 15 DAYS OF OBSERVATION. ALL RARE SPECIES OBSERVATION FORMS FOR ADDITIONAL OBSERVATIONS OF PREVIOUSLY OBSERVED SPECIES MUST BE RECEIVED BY DECEMBER 31.

The following method(s) of taking is (are) hereby authorized:

HAND CAPTURE AND IMMEDIATELY RELOCATING TURTLES OUTSIDE WORK AREAS

Collection activites under this permit shall be restricted to the following locations, subject to the approval of private landowners

NSTAR RIGHT-OF-WAYS IN ACUSHNET, BELLINGHAM, BLACKSTONE, BOURNE, EAST BRIDGEWATER, FALMOUTH, FAIRHAVEN, HANSON, KINGSTON, MATTAPOISETT, MEDWAY, MENDON, MILLVILLE, PEMBROKE, PLYMOUTH, ROCHESTER, SANDWICH, UXBRIDGE, WAREHAM, AND WHITMAN

All specimens secured under this permit shall be donated to the following institutions:

ALL ACCIDENTAL MORTALITIES OF STATE-LISTED TURTLES SHALL BE REPORTED TO THE NHESP AND DONATED TO A MASSACHUSETTS UNIVERSITY MUESEUM COLLECTION APPROVED BY THE NHESP.

No specimen taken under the authority of this permit may be sold. No specimen may be transferred to another not duly licensed.

This permit of a copy thereof shall be carried at all times by the permittee and subpermittee(s) while engaged in the activities authorized herein.

This permit does not absolve the permittee from compliance in full with any and all other applicable federal, state and local requirements, including the acquisition of a federal endangered species permit if required.

Upon expiration of this permit, a complete report detailing all collection activities shall be filed with this office and must include a listing of all species taken, numbers of specimens, and the disposition of same.

This permit, unless sooner revoked for cause, shall expire on December 31 of the year of issue.

Commonwealth of Massachusetts

Division of Fisheries & Wildlife

Wayne F. MacCallum, Director

Wayne F. MacCallum

Wayne F. MacCallum, Director

www.masswildlife.org

Division of Fisheries and Wildlife
Field Headquarters, One Rabbit Hill Road, Westborough, MA 01581 (508) 792-7270 Fax (508) 792-7275
A Agency of the Department of Fish and Game

Commonwealth of Massachusetts

Division of Fisheries & Wildlife

MassWildlife

Wayne F. MacCallum, *Director*

August 31, 2005

Operation, Maintenance, and Vegetation Management of Existing Right-of-Ways (ROW) in State-listed Turtle Priority Habitat

The routine operation, maintenance, and vegetation management of existing electrical/transmission lines (ROW) are exempt from review pursuant to the revised MA Endangered Species Act Regulations (MESA) (321 CMR 10.00) that are administered by the Natural Heritage and Endangered Species Program (NHESP) of the MA Division of Fisheries and Wildlife (Division). The exemption, which became effective July 1, 2005, is conditional based on the NHESP's annual review and approval of an Operation & Maintenance Plan (OMP) (321 CMR 10.14(7)) and the Vegetation Management Plan (VMP) (321 CMR 10.14 (12)). If vegetation management and/or other activities occur in Priority Habtat (PH), measures must be taken to minimize the mortality of state-listed species, including rare turtles. Upon receipt of all maintenance/operations area maps, the NHESP will provide utility companies with a list of state-listed species documented to occur in PH. This document provides guidance to ROW managers preparing OMPs and VMPs for areas located in PH for rare turtles. Below is an outline of procedures that shall be implemented to safeguard rare turtles. For additional information about the revised MESA regulations, please visit our website (www.nhesp.org, Regulatory Review tab).

Turtle Searches of Work Areas

Upon request, the NHESP will provide utility companies with a list of PHs documented to support state-listed turtles. In general, maintenance activities associated with VMPs and OMPs that are conducted between November 1 and April 1 will pose minimal or no risk to state-listed turtles. For all annual maintenance activities occurring between April 1 and November 1, visual inspections of the ground in front of equipment will be required at the time of work, but some areas may also require nesting habitat surveys and timing restrictions in sensitive areas. Prior to maintenance operations, trained utility staff and/or contractors will visually search the ground for turtles in front of equipment. If dense vegetation occurs within the ROW that hinders visual searches of the ground, ROW managers should raise equipment settings, so that blades are elevated a safe vertical distance from the ground elevation.

Turtle Observations and Reporting

All observed state-listed turtles will be identified, reported, and moved a safe distance in the direction the turtle was oriented when observed and outside of the limit of work (e.g. 250 ft > 500 ft). Observations of state-listed species will require the submittal of an NHESP Rare Species Observation Form, including photographs, characters used for identification, observer contact information, locus map and signature. A copy of the Rare Wildlife Observation Form is attached.

Handling of Turtles and Obtaining a Scientific Collection Permit

Each utility company will be required to obtain and annually renew a Scientific Collection Permit from the Division. Field operations and maintenance staff that are responsible for state-listed species (i.e. temporarily re-locating turtles outside of the limits of work) will serve as the subpermittees of the company's permit.

Division of Fisheries and Wildlife
Field Headquarters, One Rabbit Hill Road, Westborough, MA 01581 (508) 792-7270 Fax (508) 792-7275
An Agency of the Department of Fisheries, Wildlife & Environmental Law Enforcement

The NHESP has documented that the majority of state-listed turtle species utilize early successional/edge habitat(s) and wetlands near existing maintained ROWs. Presented below are details regarding general turtle biology and habitat conditions for each of the following species: Blanding's Turtle (*Emydoidea blandingii*), Wood Turtle (*Glyptemys insculpta*), Eastern Box Turtle (*Terrapene carolina*), Spotted Turtle (*Clemmys guttata*), and the Northern Red-bellied Cooter (*Pseudemys rubriventris*). Please note that the Blanding's Turtle is state-listed as "Threatened" and the Northern Red-bellied Turtle is state and Federally listed as "Endangered." The remaining turtles are listed "Special Concern." *A Field Guide to The Animals of Vernal Pools* (Kenney and Burne 2001), which is a good resource that provides color photos and physical descriptions of each species, can be purchased through our website site (www.nhesp.org, Publications tab) and fact sheets for these species can also be downloaded from our website (Rare Plants and Animals tab).

Turtle Biology

The general annual activity cycle of turtles is as follows:

- In the early spring, turtles emerge from hibernation and move to breeding, foraging, and basking habitat (overland and aquatic migration).
- Throughout June, female turtles nest in upland habitats with open canopy, loose, and usually sandy soil (overland migration).
- During mid to late summer (after nesting), turtles have a period of reduced activity or dormancy called estivation that occurs in wetlands and forested habitat that may surround wetland habitat utilized earlier that year (overland and aquatic migration). Eastern Box Turtles primarily estivate in cooler forested habitat during peak summer (overland migration).
- In early to mid fall, turtles move to hibernation habitat (overland and aquatic migration).
- Late November through late March turtles are in hibernation (inactive).

State-listed turtle species referenced above have a range in their amount of time spent upland, which for a single species may collectively exceed two to three months for semi-aquatic turtles (Wood, Spotted, Blanding's, and Northern Red-bellied Turtles) and upwards of seven months for upland turtles: Eastern Box Turtle) during the annual activity period. All state-listed turtle species can be observed on land from late March through November in upland non-forested (e.g. field, shrubland, ROW, etc.) and forested (e.g. oak and mixed forest) habitats. Eastern Box Turtles primarily utilize upland habitats throughout their active period, but occasionally hydrate and feed in shallow wetlands (<5 ft) for short periods of time during the year. In general, turtles are relatively easy to detect when moving, for example when traveling overland and nesting, however when estivating or at rest, they can be hard to detect (well-camouflaged with leaf litter and vegetation and enclosed in shell).

Turtle nesting occurs largely during the month of June, as females travel to open-canopy habitat with well-drained, loose, sandy-loam soils. Turtle nesting may occur in small open areas along trails, fields, grasslands, stream banks, and within the ROW. Usually, turtles will nest between the dusk and dawn hours, which is a period of low light, that protects them against mammalian predators. Once eggs are deposited in the ground, turtles immediately vacate the nesting habitat and in most cases hydrate in nearby wetlands. The majority of hatchling turtles will emerge between mid August and late October, however some hatchlings may overwinter within the nest cavity.

Handling Turtles

Prior to moving state-listed turtle species, utility companies must submit an application for a Scientific Collection Permit with the Division through the NHESP. If a state-listed turtle is observed during management operations, than a completed Rare Species Observation Form and photograph should be submitted to the NHESP.

- Before nesting season (late March-late May)
  When state-listed turtles are encountered in the ROW, field crews should immediately relocate the turtle a safe distance (e.g. 500 feet < 250 feet) outside of the limit of work to the edge of the ROW or nearest wetland. Additionally, turtles should be moved in the same direction that they were oriented when observed by field crews. Please note turtles should not be relocated by field crews across any paved road.

- During nesting season (late May-early July)
  If the turtle is not actively digging a nest, then immediately relocate the turtle per the description above. In general, the majority of state-listed turtle nesting activity will occur in the dusk to dawn hours, however if a state-listed turtle is determined to be actively digging a nest with their hind legs, then work should be avoided within 250 feet of the turtle to avoid disrupting nesting behavior. It may be possible to plan ahead and avoid prime nesting habitat during the annual nesting period (e.g. June 1 through June 30).

- After nesting season (Mid July through November)
  When turtles are encountered in the ROW, they should be relocated to areas of suitable habitat outside of the limit of work. Turtles should be relocated in the same direction that they were oriented at the time of the observation.

Turtle Habitat Descriptions and Identification

ROWs primarily provide nesting (e.g. open, well-drained, and sandy soils), basking (sun-exposure for warmth), and foraging (e.g. slugs, fruiting shrubs, mushrooms, etc.), habitat for state-listed turtles, but these areas sometimes also provide migratory, estivation, and breeding habitat for turtles. The Eastern Box Turtle, breeds in upland habitat(s) while the other referenced state-listed turtle species breed exclusively in wetlands. All of these species nest in open-canopy and loose sandy loam upland habitats. Further details regarding habitat descriptions can be found in the rare species fact sheets for each species.

- Semi-Aquatic Turtles

  Northern Red-bellied Cooter-
  Utilize freshwater ponds that have abundant aquatic vegetation. These turtles largely reside within aquatic habitats, except during the nesting season. This species is only documented to occur within Plymouth County. This species is similar in appearance to the Eastern Painted Turtle, a very common species in MA, but it can be distinguished most readily by the red or pink coloration on the bottom (plastron) of the shell, they lack lack a yellow spot, that is prominent near the eye of E. Painted Turtles, and the top of their shell is flat or slightly depressed (not rounded or domed like the E. Painted Turtle).

Blanding's Turtle-
Utilize a variety of wetland (e.g. marsh, vernal pool, river/stream, shrub swamp, forested wetlands, etc.) and upland (e.g. forest, shrubland, field, orchards, grasslands, etc.) habitats. This species has been documented to move greater than two kilometers (> 6,700 feet) between wetlands (upland and aquatic movement) and overland to upland nesting habitat in Massachusetts. This species is most easily recognized by the yellow coloration of their chin and neck.

Spotted Turtle-
Utilize a variety of wetland and upland habitats, however they do not usually travel as far as Blanding's Turtles between wetlands and they usually spend longer periods of time within wetland habitats. This species is small (saucer-sized) and has prominent yellow spots over their dark shells.

Wood Turtle-
Primary habitat is river/stream followed closely by early successional/non-forested habitat. Usually, the migratory corridor between all utilized upland and wetland habitats is the primary river/stream. Species utilizes early successional shrub/field habitat between early May and October before returning to the primary river/stream to hibernate. This species is recognized by the coarse texture of their shell (resembling wood) and the orange/bronze coloration of their neck and legs.

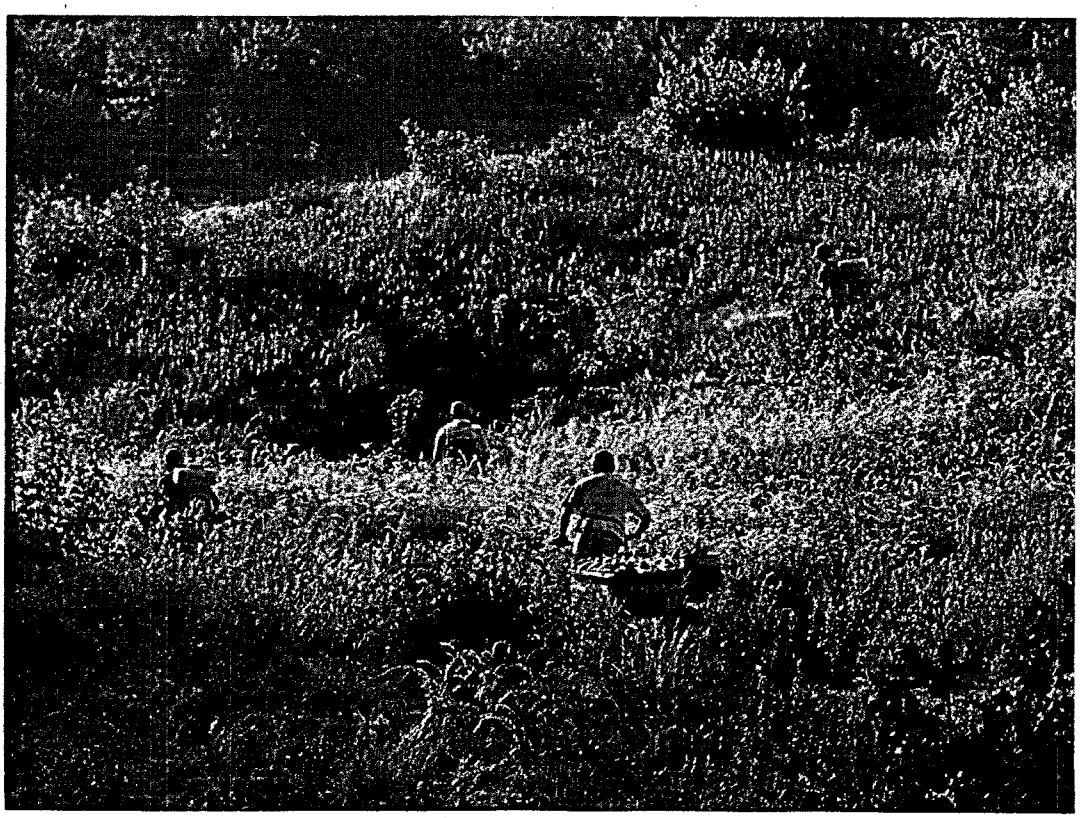
- **Upland Turtle Species**

Eastern Box Turtle-
Primary habitat includes a variety of mostly upland (early successional/shrublands, grasslands, forest, etc.) habitat. This species also occasionally visits shallow wetland (vernal pool, shrub swamp, marsh) habitat for brief periods of time between April and October to hydrate, feed, and estivate. Species will primarily occur in forested habitat from the late spring and to early fall. This species is more variable with respect to shell coloration, but it's a gradient of yellows, light browns, and gold resembling oak leaves on the forest floor.

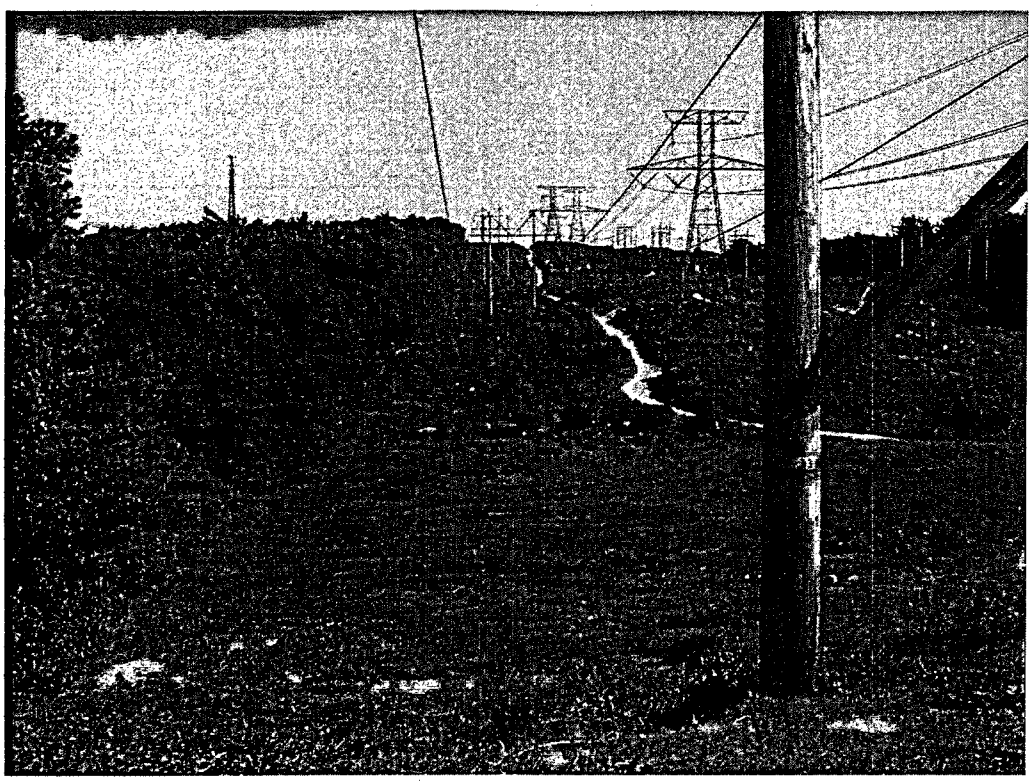
Section IV

Pictures of NSTAR's Vegetation Management

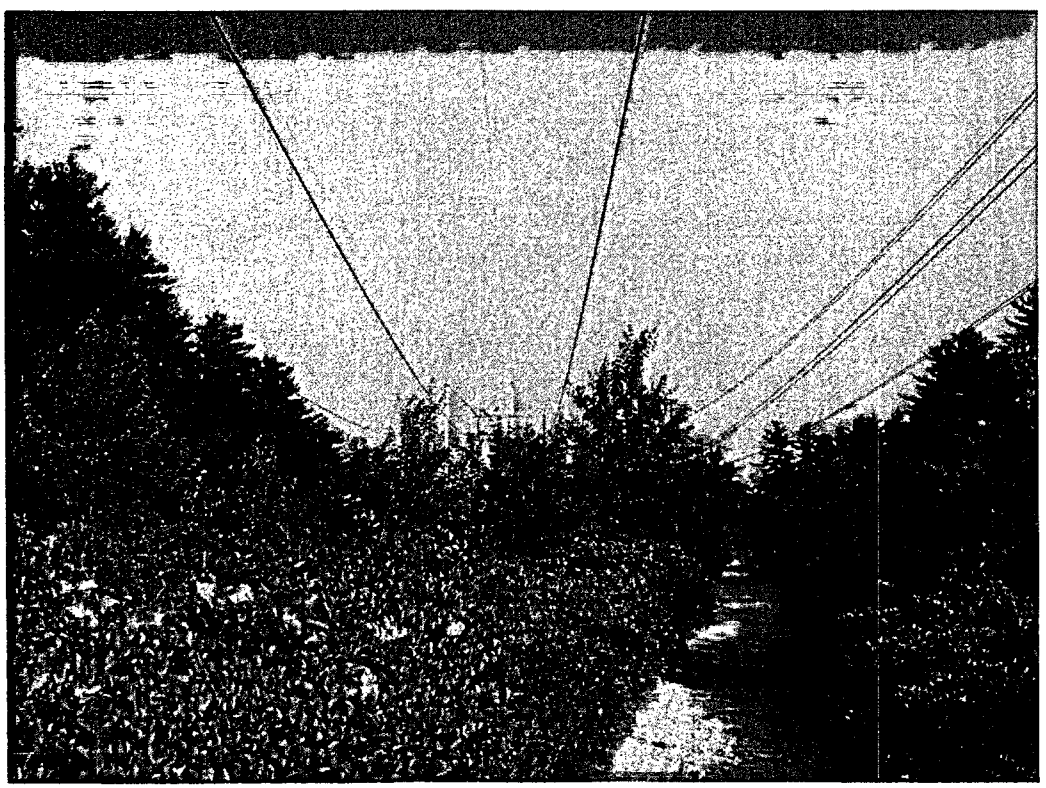
Spraying Herbicide



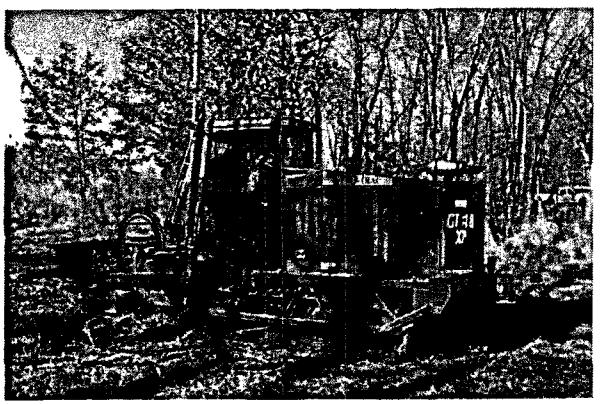
Crews Spraying Herbicide

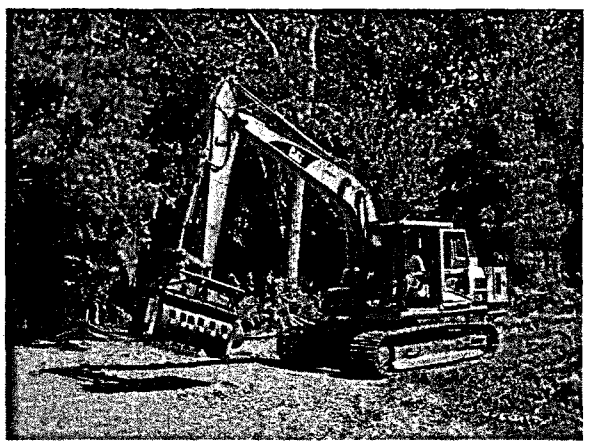


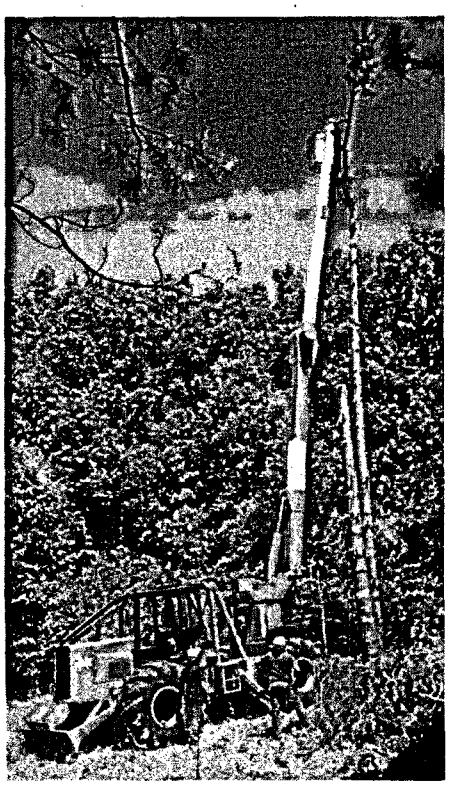
Right-of-Way Year Mowed



Same Right-of-Way in 3rd Growth Year

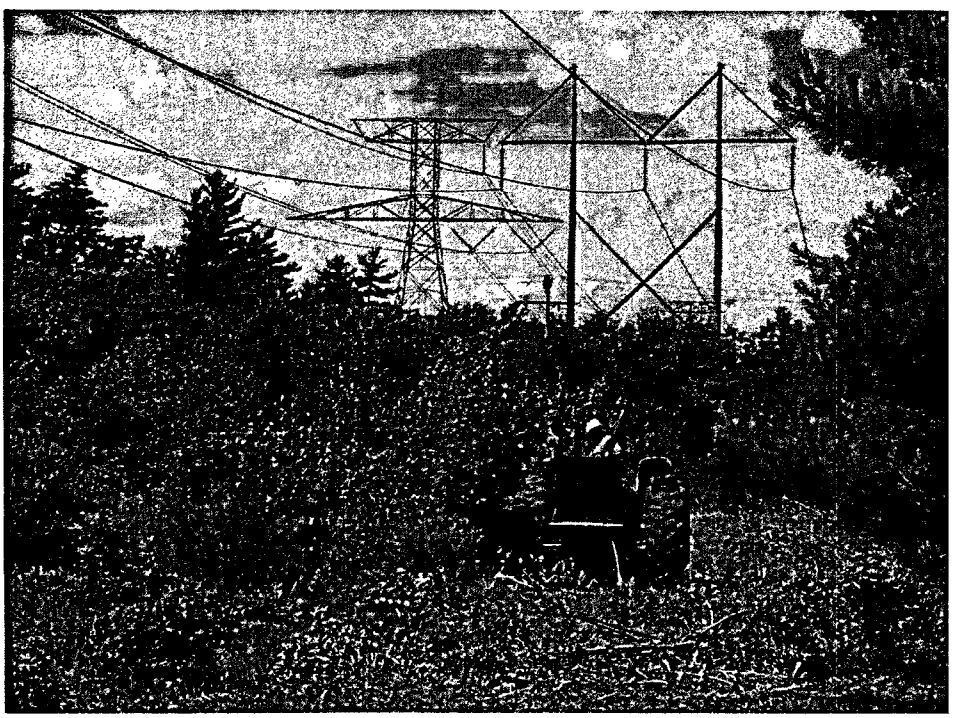






Mowing Equipment

Typical Right-of-Way Before Vegetation Maintenance



Mowing Right-of-Way

Section V

NSTAR's 2006 Vegetation Management Schedule

Section V

NSTAR's 2006 Vegetation Management Schedule

This section lists the NSTAR Rights-of-Way that NSTAR is planning to maintain in 2006. There are two lists. The first is a list of the Rights-of-Way that NSTAR is planning to treat mechanically and the second is a list of the Rights-of-Way that NSTAR is planning to treat with herbicides. These lists are approximate as changes may be required to support gas or electric operations maintenance.

Some of the mechanical work may begin in early January 2006 if conditions permit. Herbicide treatment will not begin until the fall of 2006.

This list does not include vegetation management schedules for street sidelines as work in areas within ten feet of paved streets are exempt under MESA.

Mechanical Schedule

The following lists the Rights-of-Ways that NSTAR is planning to mechanically maintain (mowing/tree cutting) in 2006. The maintenance of these Rights-of-Way may occur at any time during the year. However, the work is usually performed to avoid the spring/summernbird nesting season and begins, weather permitting, in January.

Mechanical Rights-of-Way - North	Mechanical Rights-of-Way - South
4	145
3	343
6	344
8-1	346
8-2	
18	
9	
14	
13	

Chemical Treatment Schedule

The following lists the Rights-of-Ways that NSTAR is planning to maintain using herbicides in 2006. The detail of this maintenance is provided in Section II, NSTAR's Yearly Operational Plan. Although there is no definitive schedule, Herbicide treatments usually begin in the early fall and continue until mid-November.

Herbicide Treatment Rights-of-Way - North	Herbicide Treatment Rights-of-Way - South
5	340
8-2	342
8-3	345
16	381
	143
	144
	243
	244

Appendix C

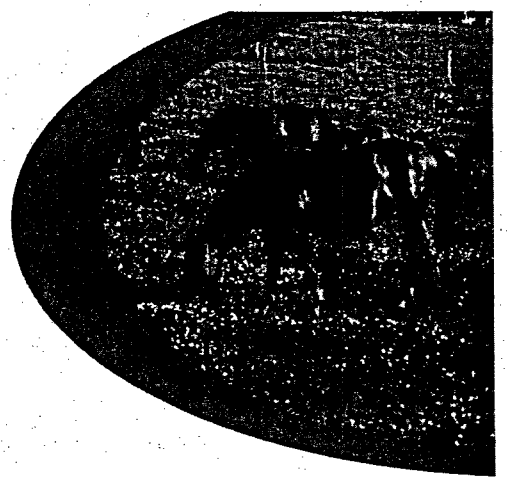
Chemical Labels

Technical Information Update

DuPont™ Krenite® S

brush control agent

DuPont™ Krenite® S brush control agent use in non-cropland areas



- DuPont™ Krenite® S is labeled for use on non-cropland sites for control of undesirable brush.
- Krenite® S has little to no activity on forage crops.
- DuPont presently has no evidence to suggest that incidental ingestion of foliage treated with Krenite® S will injure livestock.

Environmental fate and ecological effects for Krenite® S: soil dissipation and biodegradability

- This product is rapidly decomposed by soil organisms; its typical field half-life is eight days.
- Degradation products are nonphytotoxic, low-molecular weight compounds resulting from normal soil microbial breakdown processes.

Metabolism and bioaccumulation

- This product is generally slow in penetrating leaf tissue. If rainfall occurs the same day of treatment, efficacy may be reduced. The product is quickly metabolized in tolerant plant species.
- Studies show that it does not bind to or accumulate in tissues and is rapidly and extensively excreted from animals.

Ecotoxicology and mammalian toxicology

- It is practically nontoxic* to small mammalian species, fish, freshwater invertebrates and estuarine species when used in accordance with the label.
- It is also practically nontoxic* to avian species and honeybees when the label directions and precautions for use are followed.
- Based on a maximum residue study in short grass, the Environmental Protection Agency (EPA) has determined that when comparing the maximum expected environmental effect concentration (EEC) to actual mammalian data, there would be no acute or chronic mammalian effects expected to occur.*

Bottom line

As a part of the re-registration process for all products, the EPA conducted human and environmental risk assessments for the labeled uses of Krenite® S, and it will not cause unreasonable risk to humans or the environment.* Krenite® S was unconditionally re-registered in November 1997, by the EPA.*

For more information

Please contact your DuPont Vegetation Management Service Center or DuPont representative to learn more about Krenite® S brush control agent. And be sure to visit us on the Web at **krenites.dupont.com.**

* "Practically nontoxic" is a classification established by the EPA in the Re-registration Eligibility Decision (RED) for fosamine ammonium, January 1995.

Reorder No.: K-09287 (Replaces H-95442)

DUPONT

The miracles of science™

The MSDS format adheres to the standards and regulatory requirements of the United States and may not meet regulatory requirements in other countries.

"DuPont" "KRENITE" S BRUSH CONTROL AGENT
M0000022 Revised 11-JAN-2006

CHEMICAL PRODUCT/COMPANY IDENTIFICATION

Material Identification

"Krenite" is a registered trademark of DuPont.

"DuPont" is a trademark of DuPont.

Corporate MSDS Number : DU003056
Grade : CONTAINS 4 LB ACTIVE INGREDIENT PER GALLON

Tradenames and Synonyms

"KRENITE"
"KRENITE" S BRUSH CONTROL AGENT

Company Identification

MANUFACTURER/DISTRIBUTOR
DuPont
1007 Market Street
Wilmington, DE 19898

PHONE NUMBERS
Product Information : 1-800-441-7515 (outside the U.S. 302-774-1000)
Transport Emergency : CHEMTREC 1-800-424-9300(outside U.S. 703-527-3887)
Medical Emergency : 1-800-441-3637 (outside the U.S. 302-774-1000)

COMPOSITION/INFORMATION ON INGREDIENTS

Components

Material	CAS Number	%
FOSAMINE AMMONIUM (AMMONIUM SALT OF FOSAMINE [ETHYL HYDROGEN (AMINOCARBONYL) PHOSPHONATE])	25954-13-6	41.5
INERT INGREDIENTS		58.5

HAZARDS IDENTIFICATION

Emergency Overview

CAUTION! Causes (moderate) eye injury (irritation). Avoid contact with eyes or clothing.

Potential Health Effects

Inhalation of Krenite may cause irritation of nose, throat, and lungs, with cough, difficulty breathing or shortness of breath, and nonspecific discomfort, such as nausea, headache, or weakness.

Skin contact with Krenite may cause skin irritation with itching, burning, redness, swelling or rash. Significant skin penetration and systemic toxicity after skin contact appears unlikely.

There are inconclusive or unverified reports of human sensitization.

Eye contact with Krenite may cause eye irritation with tearing, pain or blurred vision.

Ingestion of high doses of Krenite may cause nonspecific discomfort such as nausea, headache or weakness.

Carcinogenicity Information

None of the components present in this material at concentrations equal to or greater than 0.1% are listed by IARC, NTP, OSHA or ACGIH as a carcinogen.

FIRST AID MEASURES

First Aid

IF IN EYES: Hold eye open and rinse slowly and gently with water for 15-20 minutes. Remove contact lenses, if present, after the first five minutes, then continue rinsing eye. Call a poison control center or doctor for treatment advice.

IF INHALED: No specific intervention is indicated as the compound is not likely to be hazardous by inhalation. Consult a physician if necessary.

IF SWALLOWED: No specific intervention is indicated as the compound is not likely to be hazardous by ingestion. Consult a physician if necessary.

IF ON SKIN OR CLOTHING: No specific intervention is indicated as the compound is not likely to be hazardous to skin by dermal exposure. Consult a physician if necessary.

(FIRST AID MEASURES - Continued)

Have the product container label with you when calling a poison control center or doctor, or going for treatment. You may also contact 1-800-441-3637 for medical emergencies involving this product.

FIRE FIGHTING MEASURES

Flammable Properties

Not a fire or explosion hazard.

Extinguishing Media

Water Spray, Foam, Dry Chemical, CO2.

Fire Fighting Instructions

Wear self-contained breathing apparatus. Wear full protective equipment. Use water spray. Cool tank/container with water spray. Runoff from fire control may be a pollution hazard.

If area is exposed to fire and conditions permit, let fire burn itself out. Burning chemicals may produce by-products more toxic than the original material. If product is on fire, wear self-contained breathing apparatus and full protective equipment. Use water spray. Control runoff.

ACCIDENTAL RELEASE MEASURES

Safeguards (Personnel)

NOTE: Review FIRE FIGHTING MEASURES and HANDLING (PERSONNEL) sections before proceeding with clean-up. Use appropriate PERSONAL PROTECTIVE EQUIPMENT during clean-up.

Emergency Response - Chemical resistant coveralls, waterproof gloves, waterproof boots and face/eye protection. If dusting occurs, use NIOSH approved respirator protection.

Initial Containment

Dike spill. Prevent material from entering sewers, waterways, or low areas.

Spill Clean Up

Soak up with sawdust, sand, oil dry or other absorbent material. Shovel or sweep up. Never return to container for reuse. Scoop into bags or boxes with plastic or aluminum shovel.

(ACCIDENTAL RELEASE MEASURES - Continued)

Accidental Release Measures

If spill area is on ground near valuable plants or trees, remove top 2 inches of soil after initial cleanup.

HANDLING AND STORAGE

Handling (Personnel)

Do not get in eyes, on skin, or on clothing. Avoid breathing vapors or mist. Wash thoroughly after handling. Do not store or consume food, drink or tobacco in areas where they may become contaminated with this material.

USERS SHOULD: Wash hands before eating, drinking, chewing gum, using tobacco or using the toilet.

Storage

Store product in original container only. Do not contaminate water, other pesticides, fertilizer, food or feed in storage.

EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls

Use only with adequate ventilation. Keep container tightly closed.

Personal Protective Equipment

Applicators and other handlers must wear:

Long-sleeved shirt and long pants.
Shoes plus socks.

Follow manufacturer's instructions for cleaning/maintaining PPE. If no such instructions for washables, use detergent and hot water. Keep and wash PPE separately from other laundry.

PPE required for early entry to treated areas that is permitted under the Worker Protection Standard and that involves contact with anything that has been treated, such as plants, soil, or water, is:

Coveralls.
Shoes plus socks.

Exposure Guidelines

Applicable Exposure Limits
FOSAMINE AMMONIUM
AEL * (DuPont) : 5 mg/m3, 8 & 12 Hr. TWA

* AEL is DuPont's Acceptable Exposure Limit. Where governmentally imposed occupational exposure limits which are lower than the AEL are in effect, such limits shall take precedence.

PHYSICAL AND CHEMICAL PROPERTIES

Physical Data

Solubility in Water	:	Soluble
Form	:	Liquid
Color	:	Colorless to brown
Specific Gravity	:	1.17 @ 24°C (75°F)

STABILITY AND REACTIVITY

Chemical Stability

Stable at normal temperatures and storage conditions.

Incompatibility with Other Materials

None reasonably foreseeable.

Decomposition

Decomposition will not occur.

Polymerization

Polymerization will not occur.

TOXICOLOGICAL INFORMATION

Animal Data

Krenite

Oral LD50:	> 5000 mg/kg in rats
Dermal LD50:	> 5000 mg/kg in rabbits
Inhalation LC50, 4 hr:	> 5.8 mg/L in rats

Krenite is a reversible moderate to severe eye irritant, a mild to moderate skin irritant, but not a skin sensitizer.

The effects of skin exposure to high doses of Krenite include non-specific effects such as weight loss. Repeated exposures to lower doses caused no signs of toxicity.

(TOXICOLOGICAL INFORMATION - Continued)

The effects of ingestion of single high doses of Krenite include diarrhea and vomiting. Repeated or long-term ingestion of lower doses caused mild diarrhea in some animals, but no other clinical or pathological evidence of toxicity.

The effects from single, high exposures by inhalation of Krenite, include respiratory and eye irritation, weight loss, and weakness.

No animal data are available to define the carcinogenic hazards of Krenite.

Krenite has not caused developmental toxicity in animals. The active ingredient, Fosamine ammonium, has not caused reproductive toxicity in animals.

Tests have shown that Krenite does not cause genetic damage in bacterial or mammalian cell cultures, or in animals. It has not been tested for heritable genetic damage.

ECOLOGICAL INFORMATION

Ecotoxicological Information

FOSAMINE AMMONIUM

AQUATIC TOXICITY:
96 hour LC50 - Rainbow trout: 330 mg/L.
96 hour LC50 - Bluegill sunfish: 590 mg/L.
96 hour LC50 - Fathead minnows: > 1000 mg/L.
48 hour LC50 - Daphnia magna: 1524 ppm.

AVIAN TOXICITY:
LD50 - Mallard Duck: > 5000 mg/kg.
LD50 - Quail. > 5000 mg/kg.
Acute Dietary LC50 - Mallard Duck: > 5620 ppm.
Acute Dietary LC50 - Quail. > 5620 ppm.

DISPOSAL CONSIDERATIONS

Waste Disposal

Treatment, storage, transportation, and disposal must be in accordance with applicable Federal, state/provincial, and local regulations. Recover nonusable free liquid and dispose of in approved and permitted incinerator. Do not flush to surface water or sanitary sewer system.

Do not contaminate water, food or feed by disposal. Wastes resulting from the use of this product may be disposed of on site or at an approved waste disposal facility.

ENVIRONMENTAL HAZARDS

(DISPOSAL CONSIDERATIONS - Continued)

Do not apply directly to water, or to areas where surface water is present, or to intertidal areas below the mean high water mark. Do not contaminate water by cleaning of equipment or disposal of equipment washwaters.

Container Disposal

Triple rinse (or equivalent) the container. Then offer for recycling or reconditioning, or puncture and dispose of in a sanitary landfill, or by incineration, or if allowed by state and local authorities, by burning. If burned, stay out of smoke.

TRANSPORTATION INFORMATION

Shipping Information

DOT/IMO
Proper Shipping Name : NOT REGULATED

REGULATORY INFORMATION

U.S. Federal Regulations

TITLE III HAZARD CLASSIFICATIONS SECTIONS 311, 312

Acute : Yes
Chronic : No
Fire : No
Reactivity : No
Pressure : No

In the United States this product is regulated by the US Environmental Protection Agency under the Federal Insecticide, Fungicide and Rodenticide Act. It is a violation of federal law to use this product in a manner inconsistent with its labeling.

EPA Reg. No. 352-395

OTHER INFORMATION

NFPA, NPCA-HMIS

NFPA Rating
Health : 1
Flammability : 0
Reactivity : 0

NPCA-HMIS Rating
Health : 1
Flammability : 0
Reactivity : 0

(Continued)

Personal Protection rating to be supplied by user depending on use conditions.

The data in this Material Safety Data Sheet relates only to the specific material designated herein and does not relate to use in combination with any other material or in any process.

Responsibility for MSDS : DuPont Crop Protection
Wilmington, DE 19898
Telephone : 1-888-638-7668

# Indicates updated section.

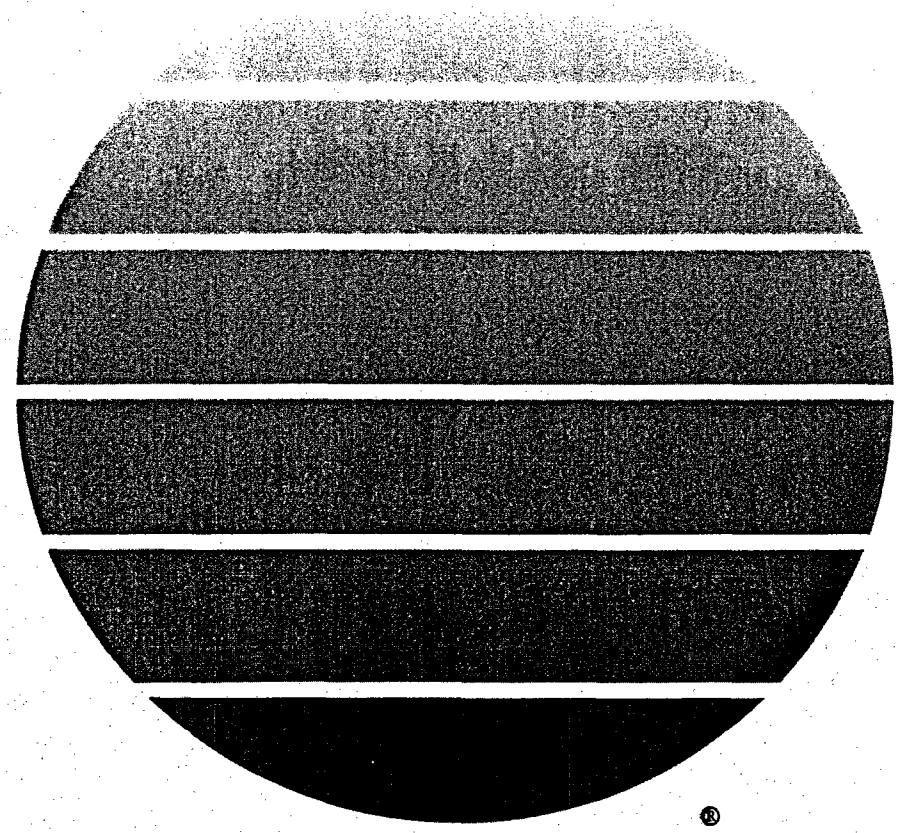
This information is based upon technical information believed to be reliable. It is subject to revision as additional knowledge and experience is gained.

End of MSDS

H - 64855

DuPont™ Escort® XP

herbicide



".....A Growing Partnership With Nature"

NSTAR

NSTAR Electric & Gas Corporation
Five-Year Vegetation Management Plan

2003 - 2007