INTEGRATED VEGETATION MANAGEMENT

2014 HERBICIDE PERMIT APPLICATION

SUBMITTED BY:

Sara L. Packer, CF
Manager of Forestry
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Licensed in New Hampshire #350
Society of American Foresters, Certified #1175

Vermont Electric Cooperative, Inc.
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March 19, 2014

Mr. Cary Giguere
Agrichemical Management Section Chief
Vermont Agency of Agriculture
Agricultural Resource Management & Environmental Stewardship
116 State Street
Montpelier, VT 05620

Cary:

Please accept Vermont Electric Cooperative's 2014 Herbicide Permit Application. Included you will find product information for all products identified for use in the permit application, as well as a compact disc with the proposed herbicide treatment area maps. VEC's Vegetation Management Plan was revised this year and is therefore, also being included with the 2014 permit application. As in the past, we have provided two hard copies and thirteen compact discs of the permit application and product information for review by the Vermont Pesticide Advisory Council (VPAC). As requested by VPAC during the 2013 permit application review, VEC's Historical Herbicide Use Data has also been incorporated with the permit application.

Also included, is a letter from the Vermont Water Supply Division confirming that the well location data used in preparing the proposed herbicide treatment area maps is current and up to date. As always, well locations will also be located and verified on the ground during herbicide application field preparation.

Please feel free to contact me if you have any questions.

My regards,

Sara L. Packer

Sara L. Packer, CF
Manager of Forestry

VERMONT

Vermont Department of Environmental Conservation *Agency of Natural Resources*
Drinking Water & Groundwater Protection Division
Old Pantry Building [phone] 802-241-3400
103 South Main Street [in-state] 800-823-6500
Waterbury, VT 05671-0403
www.vermontdrinkingwater.org

March 13, 2014

Ms. Sara Packer
Vermont Electric Cooperative, Inc.
42 Wescom Road
Johnson, Vermont 05656-9717

Subject: Herbicide Application; Utility Rights-Of-Way

Dear Ms. Packer:

The well location data you received from VT ANR is the same data the Drinking Water & Groundwater Protection Division (DWGPD) has in its database. Therefore, the DWGPD would not have a record of any wells that are not already displayed. Please note that the well location database does not provide a complete listing of all wells in the state, and many well locations may not be accurate due to the method of data collection and reporting.

If you need any other information or if you have any questions or comments, please write or call me.

Respectfully,

Kenneth Yelsey
Hydrogeologist

REQUEST FOR PERMIT TO CONDUCT RIGHTS-OF-WAY SPRAYING

Request is hereby made, pursuant to Title 6 V.S.A., Chapter 87, and the regulations issued pursuant thereto, for an approved permit to conduct spraying on rights-of-way within the State of Vermont.

A. General Information

1. Title of Organization: ***Vermont Electric Cooperative, Inc.***

2. Address: ***42 Wescom Road***
Johnson, VT 05656

3. Telephone Number: ***802-635-2331***

4. Contact Person: ***Sara Packer***

5. Type of Right-of-Way:

X a. Electric Power Transmission Line
X b. Electric Power Distribution Line
___ c. Telephone Line
___ d. Highway
___ e. Pipeline (Specify: Gas, Soil, Water)
___ f. Railroad
___ g. Airport Approaches and Safety Zones
___ h. Other - Describe

6. Type of Treatment

X a. Selective Basal
X b. Stump Treatment
___ c. Dormant Cane (Broadcast Basal)
___ d. Soil Applications (Soil Sterilant)
___ e. Ground Broadcast Stem-Foliage
___ f. Stem Injection (Frill Treatment)
X g. Other - Describe: ***Selective Low-Volume Foliar***

7. Railroad Right-of-Way Treatment ***N/A***

___ a. Ballast

___ b. Shoulder

B. Site Specific Information

1. List Towns where Treatment will be Made: ***Albany, Bakersfield, Barton, Brighton, Brownington, Cambridge, Coventry, Derby, Eden, Enosburg, Fairfield, Fletcher, Highgate, Hyde Park, Irasburg, Jay, Johnson, Lowell, Montgomery, Newark, Newport, North Hero, Sheldon, Troy, Waterville, West Charleston, Westfield, Westmore and Williston.***

2. Total Acreage to be Treated — Total Acres: ***Up to +/- 1500***

   Ground Application — Acres: ***Up to +/- 1500***

3. Width of Right-of-Way - Transmission — Feet : ***50-100***
   Width of Right-of-Way - Distribution — Feet : ***30-50***

4. Width of Area In Right-of-Way to be Treated - Transmission — Feet : ***50-100 (Full Width)***
   Width of Area In Right-of-Way to be Treated - Distribution — Feet : ***30-50 (Full Width)***

5. Anticipated Starting Date: ***June 30, 2014***

C. Special Needs - Treatment Within Buffer Strips

1. Specific Areas where Application is to be Made: ***10 foot set back on surface water***

2. Type of Vegetation to be Controlled:

Undesirable plant species (predominately fast growing tree species) which at maturity will attain a height that will endanger the safe and reliable operation of the electric facilities.

3. Pesticide(s) to be Applied (List Here and in Section E):

Rodeo (53.8% Glyphosate) ***EPA Registration # 62719-324***

4. Rate of Application (List Here and in Section E):

50% Rodeo diluted in water applied per target stem density at an anticipated rate of 0.1 to 1.87 gallons per acre.

5. Application Technique to be Implemented: ***Cut Surface***

6. Application Equipment to be Used:

Hand-held squirt bottle or low pressure hand pump with spray wand.

7. Explain how this Request will Protect Sensitive Areas, Sensitive Crops, Site Conditions, Wells, etc.:

Herbicide treatment is limited to freshly cut stump surfaces and is applied as a directed spray with hand-held equipment in close proximity to the target stump surfaces.

D. Contractor Information

1. Contractor's Name:	***Jeff Taylor and/or Bill Clough***	***Jonathan Molleur***
2. Company Name:	***Vegetation Control Services, Inc.***	***New England Tree Experts, Inc.***
3. Company Address:	***2342 Main Street Athol, MA 01331***	***709 Route 15 PO Box 504 Hardwick, VT 05843***
4. Current Vermont Applicator Certificate Number:	***18-196 and/or 18-2706***	***34W-3663***
5. Company Telephone Number:	***800-323-7706***	***802-472-6646***

E. Control Details

Pesticides to be used and rates to be applied. If more than one chemical is listed, a summary of the uses intended for each chemical must be provided. The summary should state whether the chemical will be mixed or applied separately, specifying which chemicals will control what types of vegetation. (Please Note: A copy of a label, MSDS sheet and EPA Fact Sheet [if available] must be supplied for each chemical to be used.)

Trade Name	Common Name of Active Ingredient(s)	EPA Reg. Number	Application Rate Product/Acre	Vegetation to Be Controlled	Type of Application and Equipment to be Used
Rodeo	*Glyphosate (53.8%)*	*62719-324*	*0.1 – 1.87 gal./ac.*	*Undesirable Tall Shrub and Tree Species*	*Cut Surface Treatment* *Hand-held squirt bottle or low pressure hand pump with spray wand.*
Tank Mix #1: *Rodeo ** *Escort XP* *Arsenal Powerline*	*Glyphosate (53.8%)* *Metsulfuron Methyl (60%)* *Imazapyr (26.7%)*	*62719-324* *352-439* *241-431*	*0.1-1.87 gal./ac.* *0.2-1.0 oz./ac.* *2.0 oz.-1.0 pint/ac.*	*Undesirable Tall Shrub and Tree Species*	*Selective Low-Volume Foliar Application* *Motorized and/or hand operated back-pack sprayer.*
Tank Mix #2: *Krenite S ** *Escort XP* *Arsenal Powerline*	*Fosamine Ammonium (41.5%)* *Metsulfuron Methyl (60%)* *Imazapyr (26.7%)*	*352-395 or 42750-247* *352-439* *241-431*	*0.1-3.0 gal./ac.* *0.2-1.0 oz./ac* *2.0 oz.-1.0 pint/ac.*	*Undesirable Tall Shrub and Tree Species*	*Selective Low-Volume Foliar Application* *Motorized and/or hand operated back-pack sprayer.*
Tank Mix #3: *Garlon 4 Ultra* *Escort XP*	*Triclopyr (60.45%)* *Metsulfuron Methyl (60%)*	*62719-527* *352-439*	*0.25-1.5 gal./ac.* *0.2-1.0 gal./ac.*	*Undesirable Tall Shrub and Tree Species*	*Selective Low-Volume Foliar Application* *Motorized and/or hand operated back-pack sprayer.*
Garlon 4 Ultra mixed w/ Basal Oil	*Triclopyr (60.45%)*	*62719-527*	*0.25-1.5 gal./ac.*	*Undesirable Tall Shrub and Tree Species*	*Selective Low-Volume Basal Application* *Hand operated back-pack sprayer with spray wand.* *Cut Stump Application* *Hand-held squirt bottle or low pressure hand pump with spray wand.*
Adjuvants: *Induce Surfactant* *41A Drift Retardant* *Arbor Chem Basal Oil* *(Or Comparable Products)*	*Alkylaryl Polyoxylkane* *Polyacrylamide* *Aliphatic & Cyclic Based Natural & Petroleum Distillates*	*N/A* *N/A* *N/A*			

** Individual chemical may be applied separately from tank mix as a stand- alone product in some locations with same application rate, type of application and equipment.*

F. Methods of Notification

1. List the Newspapers in which you will Advertise this Application to Comply with Section IV, 4.b., of the Vermont Regulations for Control of Pesticides.

   a) Caledonia County – Caledonian Record & Hardwick Gazette
   b) Chittenden County – The Times Argus & Burlington Free Press
   c) Essex County – The Caledonian Record & Burlington Free Press
   d) Franklin County – The Messenger & Burlington Free Press
   e) Grand Isle County – The Islander & Burlington Free Press
   f) Lamoille County – The Times Argus & Burlington Free Press
   g) *Orleans County – Newport Daily Express & Burlington Free Press*

2. Please Indicate Other Notification Option Chosen to Comply with Section IV, 4.d., of the Vermont Regulations for Control of Pesticides.

   In addition to newspaper advertisements, further notification shall be provided by three (3) spot messages per day on each of two (2) radio stations in the area of spraying on two (2) consecutive days during the two-week period prior to the commencement of spraying.

G. Other Information To Be Submitted With Application

1. Two (2) Sets of Geodetic (in 7.5 minute scale) or Orthophoto Maps indicating the Right-of-Way to be Treated. (Only one set of maps is needed if maps have been previously submitted and revisions have not been made.) ***Please see note below***

2. Current Labeling for each Pesticide to be Used.

3. Current Material Safety Data Sheet (MSDS) for each Pesticide to be Used.

4. Current Environmental Protection Agency Pesticide Fact Sheet (if available).

The undersigned accepts full responsibility for all statutes and regulations of the State of Vermont and understands that any authorization is limited to the described materials, locations and time periods stated herein.

The undersigned further understands that weekly spray and dusting operations must be reported to the Vermont Agency of Agriculture. Such written report shall be on forms furnished by the Secretary of Agriculture and placed in the mail not later than the close of business on the Monday following the week's operation.

3/20/14
Date

Signature of Applicant

(NOTE: Additional sheets may be attached to include further information.)

**** Please Note: Private wells are identified on maps according to VT Agency of Natural Resources well locator data. Locations will be verified on the ground during herbicide application field preparation.***

PRODUCT INFORMATION

Rodeo

Active Ingredient

Glyphosate

Specimen Label

Dow AgroSciences™

Rodeo®

Herbicide

®Trademark of Dow AgroSciences LLC

For control of annual and perennial weeds and woody plants in natural and production (plantations), forests for site preparation, mid-rotation release treatments, timber stand improvement activities, noncrop sites including industrial sites, rights-of-way (including roadsides, electric utility and communication transmission lines, pipelines, railroads, airports), irrigation and drainage ditches, canals, reservoirs, natural areas (including wildlife management areas, wildlife openings, wildlife habitats and refuges, parks and recreational areas, campgrounds, trailheads and trails), rangeland, and in and around aquatic sites and wetlands; also for perennial grass release, and grass growth suppression and grazed areas on these sites.

Avoid contact of herbicide with foliage, green stems, exposed non-woody roots or fruit of crops, desirable plants and trees, because severe injury or destruction may result.

Group	9	HERBICIDE

Active Ingredient:	
glyphosate† N-(phosphonomethyl)glycine, isopropylamine salt	53.8%
Other Ingredients	46.2%
Total	100.0%

†Contains 5.4 lb per gallon glyphosate, isopropylamine salt (4 lb per gallon glyphosate acid).

Precautionary Statements

Hazards to Humans and Domestic Animals

EPA Reg. No. 62719-324

CAUTION

Harmful If Inhaled

Avoid breathing spray mist. Remove contaminated clothing and wash before reuse. Wash thoroughly with soap and water after handling.

Personal Protective Equipment (PPE)

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.

Engineering Controls

When handlers use closed systems, enclosed cabs, or aircraft in a manner that meets the requirements listed in Worker Protection Standard (WPS) for agricultural pesticides [40 CFR 170.240 (d)(4-6)], the handler PPE requirements may be reduced or modified as specified in the WPS.

User Safety Recommendations

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

First Aid

If inhaled: Move person to fresh air. If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably mouth-to-mouth if possible. 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 1-800-992-5994 for emergency medical treatment information.

Environmental Hazards

Do not contaminate water when cleaning equipment or disposing of equipment washwaters. Treatment of aquatic weeds can result in oxygen depletion or loss due to decomposition of dead plants. This oxygen loss can cause fish suffocation.

In case of leak or spill, soak up and remove to a landfill.

Physical or Chemical Hazards

Spray solutions of this product should be mixed, stored and applied using only stainless steel, aluminum, fiberglass, plastic or plastic-lined steel containers.

Do not mix, store or apply this product or spray solutions of this product in galvanized steel or unlined steel (except stainless steel) containers or spray tanks. This product or spray solutions of this product react with such containers and tanks to produce hydrogen gas, which may form a highly combustible gas mixture. This gas mixture could flash or explode, causing serious personal injury, if ignited by open flame, spark, welder's torch, lighted cigarette or other ignition source.

Directions for Use

It is a violation of Federal law to use this product in a manner inconsistent with its labeling.
Read all Directions for Use carefully before applying.

This is an end-use product. Dow AgroSciences does not intend and has not registered it for reformulation.

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 responsible for pesticide regulation.

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

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.

Keep people and pets off treated areas until spray solution has dried.

Storage and Disposal

Do not contaminate water, food, feed or seed by storage or disposal.
Pesticide Storage: Store above 10°F (-12°C) to keep product from crystallizing. Crystals will settle to the bottom. If allowed to crystallize, place in a warm room 68°F (20°C) for several days to redissolve and roll or shake container or recirculate in mini-bulk containers to mix well before using.
Pesticide Disposal: Wastes resulting from use of this product that cannot be used or chemically reprocessed should be disposed of in a landfill approved for pesticide disposal or in accordance with applicable Federal, state or local procedures.

Nonrefillable containers 5 gallons or less:
Container Handling: Nonrefillable container. Do not reuse or refill this container.
Triple rinse or pressure rinse container (or equivalent) promptly after emptying. **Triple rinse** as follows: Empty the remaining contents into application equipment or a mix tank and drain for 10 seconds after the flow begins to drip. Fill the container 1/4 full with water and recap. Shake for 10 seconds. Pour rinsate into application equipment or a mix tank or store rinsate for later use or disposal. Drain for 10 seconds after the flow begins to drip. Repeat this procedure two more times. **Pressure rinse** as follows: Empty the remaining contents into application equipment or a mix tank and continue to drain for 10 seconds after the flow begins to drip. Hold container upside down over application equipment or mix tank or collect rinsate for later use or disposal. Insert pressure rinsing nozzle in the side of the container, and rinse at about 40 psi for at least 30 seconds. Drain for 10 seconds after the flow begins to drip. Then offer for recycling if available or puncture and dispose of in a sanitary landfill, or by incineration, or by other procedures allowed by state and local authorities.

Refillable containers larger than 5 gallons:
Container Handling: Refillable container. Refill this container with pesticide only. Do not reuse this container for any other purpose. Cleaning the container before final disposal is the responsibility of the person disposing of the container. Cleaning before refilling is the responsibility of the refiller. To clean the container before final disposal, empty the remaining contents from this container into application equipment or a mix tank. Fill the container about 10% full with water and, if possible, spray all sides while adding water. If practical, agitate vigorously or recirculate water with the pump for two minutes. Pour or pump rinsate into application equipment or rinsate collection system. Repeat this rinsing procedure two more times. Then offer for recycling if available, or puncture and dispose of in a sanitary landfill, or by incineration, or by other procedures allowed by state and local authorities.

Nonrefillable containers 5 gallons or larger:
Container Handling: Nonrefillable container. Do not reuse or refill this container.
Triple rinse or pressure rinse container (or equivalent) promptly after emptying. **Triple rinse** as follows: Empty the remaining contents into application equipment or a mix tank. Fill the container 1/4 full with water. Replace and tighten closures. Tip container on its side and roll it back and forth, ensuring at least one complete revolution, for 30 seconds. Stand the container on its end and tip it back and forth several times. Turn the container over onto its other end and tip it back and forth several times. Empty the rinsate into application equipment or a mix tank or store rinsate for later use or disposal. Repeat this procedure two more times. **Pressure rinse** as follows: Empty the remaining contents into application equipment or a mix tank and continue to drain for 10 seconds after the flow begins to drip. Hold container upside down over application equipment or mix tank or collect rinsate for later use or disposal. Insert pressure rinsing nozzle in the side of the container, and rinse at about 40 psi for at least 30 seconds. Drain for 10 seconds after the flow begins to drip. Then offer for recycling if available, or puncture and dispose of in a sanitary landfill, or by incineration, or by other procedures allowed by state and local authorities.

Product Information

This product is a broad spectrum, systemic, postemergent herbicide with no soil residual activity. It is intended for control of annual and perennial weeds and woody plants and brush. It is formulated as a water soluble liquid.

Time to Symptoms: The active ingredient in this product moves through the plant from the point of foliage contact to and into the root system. Visible effects are a gradual wilting and yellowing of the plant that advances to complete browning of above ground growth and deterioration of underground plant parts. Visible effects on most annual weeds occur within two to four days, but on most perennial weeds visible effects may not occur for seven days or more. Extremely cool or cloudy weather following treatment may slow the activity of this product and delay development of visual symptoms.

Stage of Weeds: Annual weeds are easiest to control when they are small. Best control of most perennial weeds is obtained when treatment is made at late growth stages approaching maturity. Refer to the annual, perennial and woody brush and trees rate tables for specific weeds. Always use the higher rate within the rate range for heavy or dense weed growth or when weeds are growing in an undisturbed (noncultivated) area. When treating weeds with disease or insect damage, weeds heavily covered with dust, or weeds under poor growing conditions, reduced weed control may result.

Cultural Considerations: Reduced control may result when applications are made to annual or perennial weeds that have been mowed, grazed, or cut, and have not been allowed to regrow to the specified stage for treatment.

Rainfastness: Heavy rainfall soon after application may wash off this product from the foliage and a repeat application may be required for adequate control.

Spray Coverage: For best results, spray coverage should be uniform and complete.

Mode of Action: The active ingredient in this product inhibits an enzyme. This enzyme is found only in plants and microorganisms that are essential to forming specific amino acids.

No Soil Activity: Weeds must be emerged at the time of application to be controlled by this product. Weeds germinating from seed after application will not be controlled. Unemerged plants arising from unattached underground rhizomes or rootstocks of perennials will not be affected by the herbicide and will continue to grow.

Biological Degradation: Degradation of this product is primarily a biological process carried out by soil microbes.

Maximum Application Rates: The maximum application rates specified in this label are given in units of volume, either fluid ounces, pints or quarts, of this product per acre. The maximum allowed application rates apply to this product combined with the use of any and all other glyphosate- or sulfosate-containing herbicides, either applied separately or in a tank mix, on the basis of total pounds of glyphosate (acid equivalents) per acre. If more than one glyphosate- or sulfosate-containing product is applied to the same site within the same year, ensure that the total of pounds acid equivalent gyphosate does not exceed the maximum allowed.

Do not apply more than 8 quarts of this product (8 lb glyphosate acid) per acre per year for all use sites listed on this label.

IMPORTANT: When using this product, unless otherwise specified, mix with a surfactant, such as a nonionic surfactant containing 80% or greater active ingredient. For conifer release (pine release) use only surfactants that are approved for conifer release and specified on the surfactant label as safe for use in conifer release (pine release). Use of this product without surfactant will result in reduced herbicide performance. Ammonium sulfate, drift control additives, or dyes and colorants may be used. See Mixing Directions and the surfactant manufacturer's label for more information.

Grazing Restrictions: This product may be used to treat undesirable vegetation in utility rights-of-way that pass through pastures, rangeland, and forestry sites that are being grazed. For tank mix applications, comply with all restrictions appearing on the tank mix product label.

Except for lactating dairy animals there are no grazing restrictions following the labeled applications of this product.

For lactating dairy animals there are no grazing restrictions for the following labeled applications of this product:
- Where the spray can be directed onto undesirable woody brush and trees, including in handgun spray to wet or low volume directed spray treatments.
- For tree injection of frill applications and for cut stump treatments.

For broadcast applications, observe the following restrictions for lactating dairy animals:
- For application rates between 4.5 and 7.5 quarts per acre, no more than 15 percent of the available grazing area may be treated.
- For application rates less than 4.5 quarts per acre, no more than 25 percent of the available grazing area may be treated.

These restrictions do not apply to pastures, rangeland or forestry sites outside of utility rights-of-way.

Herbicide Resistance Management

Glyphosate, the active ingredient in this product, is a group 9 herbicide (inhibitor of EPSP synthase). Some naturally occurring weed biotypes that are tolerant (resistant) to glyphosate may exist due to genetic variability in a weed population. Where resistant biotypes exist, the repeated use

of herbicides with the same mode of action can lead to the selection for resistant weeds. Certain agronomic practices reduce the likelihood that resistant weed populations will develop, and can be utilized to manage weed resistance once it occurs.

To delay the selection for glyphosate resistant weeds, use the following practices:

- Scout fields before and after application to detect weed escapes or shifts in weed species.
- Start with a clean field by applying a burndown herbicide or by tillage.
- Control weeds early when they are small.
- Add other herbicides, including a selective and/or a residual herbicide, and cultural practices, including tillage or crop rotation, where appropriate.
- Use the application rate for the most difficult to control weed in the field. Do not tank mix with other herbicides that reduce this product's efficacy through antagonism or with ones that encourage application rates of this product below those specified on this label.
- Control weed escapes and prevent weeds from setting seeds.
- In situations where resistant weeds are a problem, before moving from one site to another, clean equipment to minimize the spread of weed seeds or plant parts.
- Use new commercial seed that is as free of weed seed as possible.
- Report any incidence of repeated non-performance of this product against a particular weed species to the local retailer, county extension agent, or Dow AgroSciences representative.

The following good agronomic practices are recommended to reduce the spread of confirmed glyphosate-resistant biotypes:

- Tank mix this product or apply it sequentially with an appropriately labeled herbicide with a different mode of action to achieve control if a naturally occurring resistant biotype is present in the site.
- Cultural and mechanical control practices, including crop rotation or tillage, may also be used.
- To control weed escapes, including resistant biotypes, before they set seed, scout treated sites after applying this product.
- Thoroughly clean equipment before leaving any site known to contain resistant biotypes.

Because the presence of glyphosate resistance in weed populations is difficult to detect prior to use, Dow AgroSciences accepts no liability for any losses that may result from the failure of this product to control glyphosate-resistant weeds.

Attention

Avoid contact of herbicide with foliage, green stems, exposed non-woody roots or fruit of crops, desirable plants and trees, because severe injury or destruction may result.

AVOID DRIFT. Use extreme care when applying this product to prevent injury to desirable plants and crops.

Do not allow the herbicide solution to mist, drip, drift or splash onto desirable vegetation since minute quantities of this product can cause severe damage or destruction to the crop, plants or other areas on which treatment was not intended. The likelihood of injury occurring from the use of this product increases when winds are gusty, as wind velocity increases, when wind direction is constantly changing, or when there are other meteorological conditions that favor spray drift. When spraying, avoid combinations of pressure and nozzle type that will result in splatter or fine particles (mist) which are likely to drift. **Avoid applying at excessive speed or pressure.**

NOTE: Use of this product in any manner not consistent with this label may result in injury to persons, animals or crops, or other unintended consequences. Keep container closed to prevent spills and contamination.

Spray Drift Management

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. The following drift management requirements must be followed to avoid off-target drift movement from aerial applications to agricultural field crops. These requirements do not apply to forestry applications, public health uses or to applications using dry formulations.

- The distance of the outermost nozzles on the boom must not exceed 3/4 the length of the wingspan or rotor.
- Nozzles must always point backward parallel with the air stream and never be pointed downwards more than 45 degrees.

Where states have more stringent regulations, they must be observed.

The applicator should be familiar with and take into account the information covered in the Aerial Drift Reduction Advisory.

Aerial Drift Reduction Advisory
This section is advisory in nature and does not supersede the mandatory label requirements.

Importance of Droplet Size: The most effective way to reduce drift potential is to apply large droplets. The best drift management strategy is to apply the largest droplets that provide sufficient coverage and control. Applying larger droplets reduces drift potential, but will not prevent adverse effects from 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 product larger droplets.
- **Pressure** - Do not exceed the nozzle manufacturer's recommended pressures. Use the lower spray pressures for the nozzle. Higher pressure reduces droplet size and does not improve canopy penetration. 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 parallel to the airstream produces larger droplets than other orientations and is the recommended practice. Significant deflection from 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.

Boom Length: For some use patterns, reducing the effective boom length to less than 3/4 of the wingspan or rotor length may further reduce drift without reducing swath width.

Application Height: Applications must not be made at a height greater than 10 feet above the top of the largest plants unless a greater height is required for aircraft safety. Making applications at the lowest height that is safe 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 aircraft upwind. Swath adjustment distance should increase with increasing drift potential (higher wind, smaller drops, etc.).

Wind: Drift potential is lowest between wind speeds of 2 to 10 mph. However, many factors, including droplet size and equipment type, determine drift potential at any given speed. Do not apply this product when wind speed is below 2 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: Do not apply this product during a temperature inversion because drift potential is high. Temperature inversions restrict vertical air mixing, which causes small suspended droplets to remain in a concentrated cloud. This cloud 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 connected cloud (under low wind conditions) indicates an inversion, while smoke that moves upwards and rapidly dissipates indicates good vertical air mixing.

Sensitive Areas: Apply this pesticide only when the potential for drift to adjacent sensitive areas (e.g., residential areas, bodies of water, known habitat for threatened or endangered species, non-target crops) is minimal (e.g., when wind is blowing away from the sensitive areas).

Mixing Directions

Use only clean, stainless steel, fiberglass, plastic or plastic-lined steel containers to mix, store and apply spray solutions of this product. Do not mix, store or apply this product or spray solutions of this product in galvanized steel or unlined steel, except stainless steel, containers or spray tanks.

Eliminate any risk of siphoning the contents of the tank mix back into the carrier source while mixing. Use approved anti-back-siphoning devices where required by state or local regulations.

Note: Reduced results may occur if water containing soil is used, including visibly muddy water or water from ponds and ditches that is not clear.

Rodeo – Alone
This product mixes readily with water. Mix spray solutions of this product as follows:

1. Fill the mixing or spray tank with the required amount of clean water.
2. Add the specified amount of this product and nonionic surfactant near the end of the filling process and mix well.
3. During mixing and application, foaming of the spray solution may occur. To prevent or minimize foaming, avoid the use of mechanical agitators, terminate by-pass and return lines at the bottom of the tank and, if needed, use an approved anti-foam or defoaming agent.

Rodeo – Tank Mix
This product does not provide residual weed control. For residual weed control or an alternate mode of action, tank mix this product with other herbicides. Read and carefully observe the precautionary statements and all other information appearing on the labels of all herbicides used. Use according to the most restrictive label directions for each product in the mixture.

Under certain conditions, at certain growth stages, and/or under other circumstances, some tank mix products have the potential to cause injury. Read all labels for products used in the tank mix prior to using them to determine the potential for crop injury.

Tank mixing with other herbicides, insecticides, fungicides, micronutrients or foliar fertilizers may result in reduced weed control or injury. Do not use these products in applications with this product unless otherwise noted in this label. Buyer and all users are responsible for all loss or damage in connection with the use or handling of mixtures of this product with herbicides or other materials that are not expressly specified in this labeling. Mixing this product with herbicides or other materials not specified on this label may result in reduced performance.

The user is responsible for ensuring that the specific application being made is included on the label of the product used in the tank mix when a tank mixture with a generic active ingredient, including 2,4-D, atrazine, dicamba, diuron, or pendimethalin, is used.

Read all individual product labels for all products in the tank mix and observe all precautions and restrictions on the label. Use according to the most restrictive directions for each product in the tank mix. Always predetermine the compatibility of all tank mix products, together in the carrier, by mixing small proportional quantities in advance of mixing and applying them to the use site. Add the tank mix product to the tank as directed by the label. Maintain agitation and add the required amount of this product.

Maintain good agitation at all times until the contents in the tank are sprayed. If the mixture is allowed to settle, thorough agitation is required to resuspend the mixture before spraying resumes. Keep the bypass line on or near the bottom of the tank to minimize foaming. The screen size in the nozzle or line strainers should be no finer than 50 mesh.

Note: If tank mixing with Garlon® 3A herbicide, ensure that Garlon 3A is well mixed with at least 75 percent of the total spray volume before adding this product to the spray tank to avoid incompatibility.

Hand-Held Sprayers
Prepare the desired volume of spray solution by mixing the amount of this product in water as shown in the following table:

Nonionic Surfactant
When using this product, unless otherwise specified, mix with a surfactant, including a nonionic surfactant containing 80% or more active ingredient. For conifer release (pine release), use only surfactants that are approved for conifer release and specified on the surfactant label as safe for use in conifer release. Using this product without surfactant will result in reduced herbicide performance.

Colorants or Dyes
Agriculturally-approved colorants or marking dyes may be added to this product. Colorants or dyes used in spray solutions of this product may reduce performance, especially at lower rates or dilutions. Use colorants or dyes according to the manufacturer's directions.

Drift Control Additives
Drift control additives may be used with all equipment types except wiper applicators, sponge bars and CDA equipment. When a drift control additive is used, read and carefully observe the precautionary statements and all other information appearing on the additive label.

Application Equipment and Application Methods

Chemigation: Do not apply this product through any type of irrigation system.

Apply spray solutions in properly maintained and calibrated equipment capable of delivering desired volumes.

This product may be applied with the following application equipment and application methods.

Aerial Application
Equipment: Fixed wing and helicopter

Do not apply this product using aerial spray equipment except under conditions as specified within this label.

For aerial application in California, refer to the supplemental label entitled for aerial applications in that state for specific instructions, restrictions, and requirements. **Note:** Do not aerially apply this product in a tank mix with dicamba in California.

Avoid drift. Do not apply when winds are gusty or under any other condition which favors drift. Drift may cause damage to any vegetation contacted to which treatment is not intended. To prevent injury to adjacent desirable vegetation, maintain appropriate buffer zones.

Do not directly apply to any body of water.

Use the specified rates of this herbicide in 3 to 25 gallons of water per acre unless otherwise specified on this label. Refer to the specific use directions of this label for volumes and application rates.

Coarse sprays are less likely to drift; therefore, do not use nozzles or nozzle configurations that dispense spray as fine spray droplets. Do not angle nozzles forward into the airstream and do not increase spray volume by increasing nozzle pressure. A drift control additive may be used. When a drift control additive is used, carefully read and observe the precautionary statements and all other information specified on the additive label.

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

Ground Application
Equipment: Boom or boomless systems, pull-type sprayer, floaters, pick-up sprayers, spray coupes and other ground broadcast equipment.

Use the specified rates of this product in 3 to 40 gallons of water per acre as a broadcast spray unless otherwise specified on this label. As density of weeds increases, increase the spray volume within the rate range to ensure complete coverage. Carefully select proper nozzles to avoid spraying a fine mist. For best results with ground application equipment, use flat fan nozzles. Check for even distribution of spray droplets.

Hand-Held and High-Volume Including Backpack Application
Equipment: Knapsack and backpack sprayers, pump up pressure sprayers, handguns, hand wands, mistblowers, lances, and other hand-held and motorized spray equipment used to direct the spray onto weed foliage. **Note:** This product is not registered in Arizona or California for use in mistblowers.

Apply to foliage of vegetation to be controlled. Do not spray to the point of runoff for applications made on a spray to wet basis. Use coarse sprays only. For best results, cover the top half of the plant and at least half of the total foliage. To ensure adequate spray coverage, spray both sides of large or tall woody brush and trees, when foliage is thick and dense, or where there are multiple sprouts.

High Volume Sprays: Prepare a 3/4 to 2 percent solution of this product in water, add a nonionic surfactant and apply to foliage of vegetation to be controlled. For specific rates of application and instructions for control of various annual and perennial weeds, see the Weeds Controlled section.

Make applications on a spray to wet basis with uniform and complete spray coverage. Do not spray to point of runoff.

Low Volume Directed Sprays: This product may be used as a 5 to 10 percent solution in low volume directed sprays for spot treatment of trees and brush. This treatment method is most effective in areas where there is a low density of undesirable trees or brush. If a straight stream nozzle is used, start the application at the top of the targeted vegetation and spray from top to bottom in a lateral zigzag motion. Ensure that at least 50 percent of the leaves are contacted by the spray solution. For flat fan and cone nozzles and with hand-directed mist blowers, mist the application over the foliage of the targeted vegetation. Treat small, open-branched trees only from one side. If the foliage is thick or there are multiple root sprouts, apply from several sides to ensure adequate spray coverage. Prepare the desired volume of spray solution by mixing the amount of this product in water as shown in the following table.

Spray Solution:

Desired Volume	Amount of This Product								
	0.5	0.75	1	1.25	1.5	2	5	8	10
1 gal	2/3 fl oz	1 fl oz	1 1/3 fl oz	1 2/3 fl oz	2 fl oz	2 2/3 fl oz	6 1/2 fl oz	10 1/4 fl oz	13 fl oz
25 gal	1 pt	1 1/2 pt	1 qt	1 1/4 qt	1 1/2 qt	2 qt	1 1/4 gal	2 gal	2 1/2 gal
100 gal	2 qt	3 qt	1 gal	1 1/4 gal	1 1/2 gal	2 gal	5 gal	8 gal	10 gal

2 Tablespoons = 1 fl oz

For best results when using knapsack sprayers, mix the specified amount of product with water in a larger container. Fill the knapsack sprayer with the solution and add the correct amount of surfactant.

Selective Equipment
Equipment: Recirculating sprayers, shielded and hooded sprayers, wiper applicators and sponge bars.

Do not contact desirable vegetation with herbicide. Droplets, mist, foam, or splatter of the herbicide settling on desirable vegetation is likely to result in discoloration, stunting or destruction.

Better results are obtained when more of the weed is exposed to the herbicide solution. Weeds not contacted by the herbicide solution will not be affected. This may occur in dense clumps, severe infestations, or when the height of weeds varies so that not all weeds are contacted. If this occurs, repeat treatment may be necessary.

Shielded and Hooded Applicators: A shielded or hooded applicator directs the herbicide solution onto weeds while shielding desirable vegetation from the herbicide. Use nozzles that provide uniform coverage within the treated area. Keep shields on these sprayers adjusted to protect desirable vegetation. **Exercise extreme care to avoid contact of the herbicide with desirable vegetation.**

Wiper Applicators: Wiper applicators are devices that physically wipe appropriate amounts of this product directly onto the weed. Equipment must be designed, maintained and operated to prevent the herbicide solution from contacting desirable vegetation.

Adjust wiper applicators used over the top of desirable vegetation so that the wiper contact point is at least 2 inches above the desirable vegetation. Better results are obtained when more of the weed is exposed to the herbicide solution. Weeds should be a minimum of 6 inches above the desirable vegetation. Adjust the applicator height to ensure adequate contact with weeds as weeds not contacted by the herbicide solution will not be affected. Poor contact may occur when weeds are growing in dense clumps, in severe weed infestations, or when weed height varies dramatically. If this occurs, repeat treatment may be necessary.

Operate this equipment at ground speeds no more than 5 mph. Performance may be improved by reducing speed in areas of heavy weed infestations to ensure adequate wiper saturation. Better results may be obtained if two applications are made in opposite directions.

Droplets, mist, foam, or splatter of the herbicide settling onto desirable vegetation may result in discoloration, stunting or destruction. Avoid leakage or dripping onto desirable vegetation. Adjust height of applicator to ensure adequate contact with weeds. Keep wiping surfaces clean. Be aware that on sloping ground the herbicide solution may migrate, causing dripping on the lower end and drying of the wicks on the upper end of a wiper applicator.

Do not use wiper equipment when weeds are wet.

Mix only the amount of solution to be used during a one-day period as reduced activity may result from use of leftover solutions. Clean wiper parts by thoroughly flushing with water immediately after using this product.

For best results, use a nonionic surfactant at a rate of 10 percent by volume of total herbicide solution for all wiper applications.

Injection Systems
Equipment: Aerial or ground injection sprayers.

This product may be used in aerial or ground injection spray systems. It may be used as a liquid concentrate or diluted prior to injecting into the spray stream. Do not mix this product with the concentrate of other products when using injection systems.

Controlled Droplet Applicator (CDA)
Equipment: Hand-held or boom-mounted applicators that produce a spray consisting of a narrow range of droplet sizes.

The rate of this product applied per acre by vehicle-mounted CDA equipment must not be less than the amount specified on this label when applied by conventional broadcast equipment. For vehicle-mounted CDA equipment, apply 3 to 15 gallons of water per acre.

For the control of annual weeds with hand-held CDA units, apply a 20 percent solution of this product at a flow rate of 2 fl oz per minute and a walking speed of 1.5 mph (1 1/2 pints of product per acre). For control of perennial weeds, apply a 20 to 40 percent solution of this product at a flow rate of 2 fl oz per minute and a walking speed of 0.75 mph (3 to 6 pints of product per acre).

CDA equipment produces a spray pattern that is not easily visible. Exercise extreme care to avoid spray or drift contacting the foliage or any other green tissue of desirable vegetation as damage or destruction may result.

Use Sites

Use this product in noncrop areas, including airports, apartment complexes, aquatic sites, Christmas tree farms, commercial sites, Conservation Reserve Program (CRP) areas, ditch banks, driveways, dry ditches, dry canals, fencerows, golf courses, greenhouses, habitat management, industrial areas, lumber yards, manufacturing sites, municipal sites, natural areas, office complexes, ornamentals, parking areas, parks, pastures, petroleum tank farms and pumping installations, plant nurseries, public areas, railroads, rangeland, recreation areas, utility rights-of-way, roadsides, shadehouses, sod or turf seed farms, sports complexes, storage areas, substations, turfgrass areas, utility sites, warehouse areas, wildlife habitat management areas, and in grazed areas on these sites.

Aquatic Sites

This product may be applied to emerged weeds in all bodies of fresh and brackish water that may be flowing, nonflowing or transient including lakes, rivers, streams, ponds, estuaries, rice levees, seeps, irrigation and drainage ditches, canals, reservoirs, wastewater treatment facilities, wildlife habitat restoration and management areas and similar sites.

If aquatic sites are present in the noncrop area and are part of the intended treatment, read and observe the following directions:

- This product does not control plants that are completely submerged or have a majority of their foliage under water.
- There is no restriction on the use of treated water for irrigation, recreation or domestic purposes.
- Consult local and state fish and game agency and water control authorities before applying this product to public water. Permits may be required to treat such water.
- To make aquatic applications around and within 1/2 mile of active potable water intakes, the water intake must be turned off for a minimum period of 48 hours after the application. The water intake may be turned on prior to 48 hours if the glyphosate level in the intake water is below 0.7 parts per million as determined by laboratory analysis. These aquatic applications may be made **only** in those cases where there are alternative water sources or holding ponds which would permit the turning off of an active potable water intake for a minimum period of 48 hours after the application.
- For treatments after draw down of water or in dry ditches, allow 7 days or more after treatment before reintroduction of water to achieve maximum weed control. Apply this product within 1 day after draw down to ensure application to actively growing weeds.
- Floating mats of vegetation may require retreatment. Avoid wash off of sprayed foliage by spray boat or recreational boat backwash or by rainfall within 6 hours of application. Do not re-treat within 24 hours following the initial treatment.
- Applications made to moving bodies of water must be made while traveling upstream to prevent concentration of this herbicide in water. When making any bankside applications, do not overlap more than 1 foot into open water. Do not spray in bodies of water where weeds do not exist. The maximum application rate of 7 1/2 pints per acre must not be exceeded in any single broadcast application that is being made over water.
- When emerged infestations require treatment of the total surface area of impounded water, treating the area in strips may avoid oxygen depletion due to decaying vegetation. Oxygen depletion may result in fish kill.

Restrictions:
- Do not apply this product directly to water within 1/2 mile upstream of an active potable water intake in flowing water (i.e., river, stream, etc.),

or within 1/2 mile of an active potable water intake in a standing body of water, such as a lake, pond or reservoir. This restriction does not apply to intermittent inadvertent overspray of water in terrestrial use sites.

Wetland Sites

This product may be applied to undesirable vegetation in and around water (aquatic areas) and wetlands found in forestry, utility rights-of-way sites or other site listed on the label, including where these sites are adjacent to or surrounding domestic water supply reservoirs, supply streams, lakes and ponds.

If wetland sites are present, read and observe the following directions:

- There is no restriction on the use of treated water for irrigation, recreation or domestic purposes.
- Consult local public water control authorities before applying this product in and around public water. Permits may be required to treat in such areas.

Restrictions:

- Do not apply this product directly to water within 1/2 mile upstream of an active potable water intake in flowing water (i.e., river, stream, etc.), or within 1/2 mile of an active potable water intake in a standing body of water, such as a lake, pond or reservoir. This restriction does not apply to intermittent inadvertent overspray of water in terrestrial use sites.
- Do not spray open bodies of water where woody brush, trees and herbaceous weeds do not exist. Do not apply more than 3 3/4 quarts per acre in a single over water broadcast application except in stream crossings in utility right-of-way or where applications will result in less than 20 percent of the total water area being treated. In either of these locations, any specified rate may be applied:

Christmas Tree Plantations

Broadcast Application (Oregon and Washington Only)
Broadcast apply this product over the established Christmas tree species Douglas fir (*Pseudotsuga menziesii*), fir species (*Abies* spp.), pine species (*Pinus* spp.) (except eastern white, loblolly, longleaf, shortleaf, slash), and spruce species (*Picea* spp.). Use 1 quart of this product per acre in 5 to 30 gallons of water per acre. For best results, add up to 10 fl oz of Entry II surfactant per acre. If using a different surfactant, follow the manufacturer's directions for use and ensure conifer safety has been adequately tested for that surfactant. Apply after trees have completed at least a full growing season since planting or transplanting.

Apply only in the fall after the formation of the final conifer resting buds or in the spring prior to initial bud swell. Final resting buds must be fully hardened and in the dormant stage. Applying this product at any other time may result in unacceptable injury to the Christmas trees. Avoid spray pattern overlap as injury may occur.

In some areas, 1 to 2 quarts of this product per acre may be used. Consult your local representative for specific use instructions if rates greater than 1 quart per acre are required.

For best results, do not use drift control additives as they may increase injury to Christmas trees.

Precautions and Restrictions:

- **Preharvest Interval:** Do not apply within 1 full year prior to tree harvest.
- Ensure that adequate buffers are maintained to prevent drift onto nearby desirable crops or vegetation.

Cut Stump

Treat cut stumps in any noncrop site listed on this label. This product will control regrowth of freshly cut stumps and resprouts of many types of woody brush and tree species, some of which are listed below. Apply this product using suitable equipment to ensure coverage of the entire cambium. Cut trees or resprouts close to the soil surface. Apply a 50 to 100 percent solution of this product to freshly cut surface immediately after cutting. Delays in application may result in reduced performance. For best results, make applications during periods of active growth and full leaf expansion.

When used according to directions for cut stump application, this product will control, partially control or suppress most woody brush and tree species, some of which are listed below:

Common Name	Scientific Name
alder	*Alnus* spp.
coyotebrush[1]	*Baccharis pilularis*
dogwood[1]	*Cornus* spp.
eucalyptus	*Eucalyptus* spp.
hickory[1]	*Carya* spp.
madrone, Pacific	*Arbutus menziesii*
maple[1]	*Acer* spp.
oak	*Quercus* spp.
peppertree, Brazilian	*Schinus terebinthifolius*
Australian-pine,	*Casuarina equisetifolia*
poplar[1]	*Populus* spp.
reed, giant	*Arundo donax*
saltcedar	*Tamarix ramosissima*
sweetgum[1]	*Liquidambar styraciflua*
sycamore[1]	*Platanus occidentalis*
tan oak	*Lithocarpus densiflorus*
willow	*Salix* spp.

[1]Do not use this product on these species in the state of California.

Precautions and Restrictions:

- Do not make cut stump applications when the roots of desirable woody brush or trees may be grafted to the roots of the cut stump. Some sprouts, stems, or trees may share the same root system.
- Adjacent trees that are of a similar age, height and spacing may indicate shared roots.
- Injury is likely to occur to non-treated stems or trees when one tree or more that shares a common root is treated.

Injection and Frill (Woody Brush and Trees)

Woody vegetation may be controlled by injection or frill application of this product. Apply this product using suitable equipment that penetrates into the living tissue. Apply the equivalent of 1 mL of this product per each two to three inches of trunk diameter at breast height (DBH). This is best achieved by applying 50 to 100 percent concentration of this product either to a continuous frill around the tree or as cuts evenly spaced around the tree below all branches. As tree diameter increases in size, better results are achieved by applying diluted material to a continuous frill or more closely spaced cuttings. Do not make any applications that allow runoff to occur from frilled or cut areas in species that exude sap freely. In species such as this, make frill or cuts at an oblique angle to produce a cupping effect and use a 100 percent undiluted concentration of this product. For best results, apply during periods of active growth and full leaf expansion.

This product controls the following woody species:

Common Name	Scientific Name
oak	*Quercus* spp.
poplar	*Populus spp.*
sweetgum	*Liquidambar styraciflua*
sycamore	*Platanus occidentalis*

This product suppresses the following woody species:

Common Name	Scientific Name
blackgum[1]	*Nyssa sylvatica*
dogwood	*Cornus* spp.
hickory	*Carya* spp.
maple, red	*Acer rubrum*

[1]Do not use this product on these species in the state of California.

Forestry Site Preparation

This product is for the control or partial control of woody brush, trees, and herbaceous weeds in forestry. This product is also for use in preparing or establishing wildlife openings within these sites and maintaining logging roads.

In forestry sites, use this product in site preparation prior to planting any tree species including Christmas trees, eucalyptus, hybrid tree cultivars and silvicultural nursery sites. Unless otherwise specified, make applications of this product for control or partial control of herbaceous weeds, woody brush and trees listed in the Weeds Controlled section.

Application Rates

Method of Application	Rate	Spray Volume (gal/acre)
Broadcast		
aerial	1.5 - 7.5 qt/acre	5 - 30
ground		10 - 60
Spray to Wet		
handgun, backpack	0.75 - 2%	spray to wet
mistblower	by volume	
Low Volume Directed Spray[1]		
handgun, backpack	5 - 10%	partial coverage
mistblower	by volume	

[1] For low volume directed spray applications, coverage should be uniform with at least 50% of the foliage contacted. For best results, coverage of the top one-half of the plant, including the growing tip, is important (over the top and down coverage) To ensure adequate spray coverage, spray all sides of large or tall woody brush and trees, when foliage is thick and dense, or where there are multiple sense or tall sprouts.

Use a higher rate in the rate range for control or partial control of woody brush, trees and hard to control perennial herbaceous weeds. For best results, apply to actively growing woody brush and trees after full leaf expansion and before leaf drop. Use increased rates within the rate range to control perennial herbaceous weeds from emergence up to the appearance of seedheads, flowers or berries. Use a lower rate in the rate range to control annual herbaceous weeds and actively growing perennial herbaceous weeds after seedheads, flowers or berries appear. Apply to foliage of actively growing annual herbaceous weeds anytime after emergence.

This product has no herbicidal or residual activity in the soil. Where repeat applications are necessary, do not apply more than 8 quarts of product per acre per year.

Tank Mixes
This product may be used in tank mix combination with other herbicide products to broaden the spectrum of vegetation controlled. When tank mixing, read and observe applicable use directions, precautions and limitations on the respective product labels. Use according to the most restrictive precautionary statements for each product in the mixture. Any specified rate of this product may be used in a tank mix.

Note: For forestry site preparation, make sure the tank mix product is approved for use prior to planting the desired species. Observe planting interval restrictions.

Any specified rate of this product may be used in a tank mix with the following products for forestry site preparation:

Product	Method of Application	Rate
Milestone VM[1]	broadcast[3]	5 – 7 fl oz/acre
Garlon 3A[2]		1 – 4 qt/acre
Garlon 4		
Arsenal Applicators Concentrate		2 – 16 fl oz/acre
Escort		1/2 – 1 1/2 oz/acre
Chopper		4 – 32 fl oz/acre
Oust XP		1 – 4 oz/acre
Arsenal Applicators Concentrate	spray to wet	1/32 – 1/2% by volume
Arsenal Applicators Concentrate	low volume directed spray	1/8 – 1/2% by volume

[1]Use Milestone VM only in those states that have a Special Local Need label for use in forestry.
[2]Ensure that Garlon 3A is thoroughly mixed with water before adding this product. Agitation is required while mixing this product with Garlon 3A to avoid compatibility problems.
[3]When using a tank mix partner, up to the maximum labeled rate for a treatment site may be applied in combination with this product.

For control of herbaceous weeds, use the lower specified tank mixture rates. For control of dense stands or difficult to control woody brush and trees, use the higher specified rates.

Aerial Application
Aerially apply this product by helicopter only in forestry sites. See Aerial Application in Application Equipment and Application Methods for more details.

Ground Application
Apply this product using suitable ground equipment for broadcast applications in forestry sites. See Ground Application in Application Equipment and Application Methods for more details. Unless otherwise specified, apply the specified rates of this product as a broadcast spray in sufficient spray volume to provide complete and uniform coverage of plant foliage. Check for even distribution throughout the spray pattern.

Hand-Held and Backpack Application
Apply this product using handgun and backpack equipment in forestry sites. See Hand-Held and Backpack Application in Application Equipment and Application Methods for more details. For spray to wet applications, coverage should be uniform and complete, but not to the point of runoff.

This product may be used for low volume directed sprays for spot treatment of trees and brush. It is most effective in areas where there is a low density of undesirable trees or brush. For flat fan and cone nozzles, spray the foliage of the targeted vegetation. Small, open branched trees need only be treated from one side. If the foliage is thick or there are multiple root sprouts, apply from several sides to ensure adequate spray coverage.

Forestry Conifer and Hardwood Release

Directed Sprays and Selective Equipment
Apply this product as a directed spray or with selective equipment in forestry conifer and hardwood sites, including Christmas tree plantations and silvicultural nurseries. A surfactant must be used with this product. Use only surfactants approved for conifer release and specified on the surfactant label as safe for use in conifer release (pine release). Using this product without a surfactant will result in reduced herbicide performance. See Mixing Directions and Application Equipment and Application Methods sections.

Avoid contact of spray drift, mist or drips with foliage, green bark or non-woody surface roots of desirable plant species.

Tank Mixes: When tank mixing, read and observe applicable use directions, precautions and limitations on the respective product labels. Use according to the most restrictive precautionary statements for each product in the mixture.

Broadcast Application Outside Area of Southeastern United States
Apply this product as a broadcast application for release of Douglas fir (*Pseudotsuga menziesii*), fir (*Abies* species), hemlock (*Tsuga* species), pines (*Pinus* species) (includes all species except loblolly, longleaf, shortleaf, or slash), and California redwood (*Sequoia* species) outside the area of the southeastern United States. Apply this product as a broadcast application only after formation of final conifer resting buds in the fall or prior to initial bud swelling in the spring. Note: Except where specified, make broadcast applications of this product only where conifers have been established for more than one year.

Injury may occur to conifers treated for release, especially where spray patterns overlap or the higher rates are applied. Damage can be accentuated if applications are made when conifers are actively growing, are under stress from drought, flood water, improper planting, insects, animal damage or diseases.

Apply 3/4 to 1 1/2 quarts per acre as a broadcast spray. Apply 3/4 to 1 1/8 quarts of this product per acre to release Douglas fir, pine and spruce species at the end of the first growing season (except California). Ensure all conifers are well hardened off.

A surfactant must be used with this product for optimum weed control. Use only surfactants approved for use in over the top release applications. Using this product without a surfactant will result in reduced herbicide performance. For best results, do not use a surfactant for release of hemlock species or California redwood. In mixed conifer stands, injury to these species may result if a surfactant is used. See Mixing Directions and Application Equipment and Application Methods sections.

For release of Douglas fir, a nonionic surfactant for over the top foliar spray may be used. To avoid possible conifer injury, use nonionic surfactants at 2 fl oz per acre at elevations above 1500 feet, or 1 fl oz per acre in the coastal range or at elevations below 1500 feet. Using a higher rate of surfactant may result in unacceptable conifer injury. Ensure the nonionic surfactant has been adequately tested for safety to Douglas fir before using.

Tank Mixes with Oust XP: Apply 3/4 to 1 1/2 quarts of this product with 1 to 3 oz of Oust XP per acre to release jack pine and white. Use 1 to 1 1/2 oz of Oust XP per acre with this product to release white pine. Make applications to actively growing weeds as a broadcast spray over the top of established conifers. Make applications after formation of conifer resting buds in the late summer or fall.

Tank Mixes with Arsenal Applicators Concentrate: Apply 3/4 to 1 1/8 quarts of this product with 2 to 6 fl oz of Arsenal Applicators Concentrate per acre to release Douglas fir. Apply 1 1/2 quarts of this product with 1 to 2 1/2 fl oz of Arsenal Applicators Concentrate per acre to release balsam fir and red spruce.

In **Maine** and **New Hampshire**, apply up to 2 1/4 quarts of this product per acre to control or suppress difficult to control hardwood species. For the release of red pine, balsam fir, red spruce, white spruce, Norway spruce, and black spruce with dense tough to control brush, and where maples make up a large component of the undesirable trees, this product may be tank mixed with 1 to 2 1/2 fl oz of Arsenal Applicators Concentrate and 1 to 3 oz of Oust XP per acre. Apply this mix as a broadcast spray.

Broadcast Application in Southeastern United States
Apply this product as a broadcast application for release of loblolly pine (*Pinus taeda*), eastern white pine (*Pinus strobus*), shortleaf pine (*Pinus echinata*), slash pine (*Pinus elliottii*), Virginia pine (*Pinus virginiana*), and longleaf pine (*Pinus palustris*) in the southeastern United States.

Apply 1 1/8 to 1 7/8 quarts of this product per acre as a broadcast spray during late summer or early fall after the conifers have hardened off. For applications at the end of the first growing season, use 3/4 quart of this product alone or in a tank mix.

Tank Mixes with Arsenal Applicators Concentrate: For conifer release, apply 3/4 to 1 1/2 quarts of this product with 2 to 16 fl oz of Arsenal Applicators Concentrate per acre as a broadcast spray. Use only on conifer species that are labeled for over the top spray for both products. Use the higher specified rates for dense tough to control wood brush and trees.

Herbaceous Release
When applied as directed, this product plus listed residual herbicides provide postemergence control of the annual weeds and control or suppression of the perennial weeds listed in this label, and residual control of the weeds listed in the residual herbicide label. Make applications to actively growing weeds as a broadcast spray over the top of labeled conifers.

Use a surfactant labeled for use in over the top herbaceous release applications. Using this product without a surfactant will result in reduced herbicide performance. See Mixing Directions and Application Equipment and Application Methods sections on this label.

Weed control may be reduced if spray solution water volumes exceed 25 gallons per acre for these treatments.

Tank Mixes with Oust XP: Apply 12 to 18 fl oz of this product with 2 to 4 oz of Oust XP per acre to release loblolly pines. Apply 9 to 12 fl oz of this product with 2 to 4 oz of Oust XP per acre to release slash pines.

Tank Mix with Atrazine: Apply 3/4 quarts of this product with 4 lb ai of atrazine per acre to release Douglas fir. Apply only over Douglas fir that has been established for at least one full growing season. Apply in the early spring, usually mid-March through early April. Injury will occur if applications are made after bud swell in the spring. For this use, do not add surfactant to the tank mix.

In **Maine** and **New Hampshire**, for release of red pine, balsam fir, red spruce, white spruce, Norway spruce, and black spruce with heavy grass and herbaceous weeds infesting the site, up to 2 1/4 quarts of this product per acre may be tank mixed with 1 to 3 oz of Oust XP to control grass, herbaceous weeds and woody brush. Apply this mix as a broadcast spray.

Mid-Rotation Conifer Release and Spot Treatments for Crop Tree Release and Timber Stand Improvement

This product is applied as a ground broadcast or directed spray application for mid-rotation release applications under the canopy of pines (and other conifers) and hardwoods. Make applications using application techniques that prevent or minimize direct contact to the foliage of crop trees (including in stands of pine, other conifers, or hardwood). This may be accomplished using directed sprays and ground equipment with nozzles oriented to target only undesirable understory vegetation below the crop tree canopy. This product is applied as a spot, individual plant treatment for woody and herbaceous weeds (see Hand-Held and Backpack Application in Application Equipment and Application Methods section). When making spot applications, do not allow spray to contact the foliage of desirable crop trees.

Noncrop Areas and Industrial Sites

See the rate tables in the Annual Weeds, Perennial Weeds, and Woody Brush and Trees sections for specific application rates. This product has no herbicidal or residual activity in the soil. Where repeat applications are necessary, do not apply more than 8 quarts of this product per acre per year.

Use a higher rate in the rate range for control or partial control of woody brush, trees, and hard to control perennial herbaceous weeds. For best results, apply to actively growing woody brush and trees after full leaf expansion and before fall color and leaf drop. Use increased rates within the rate range for difficult to control species, where dense stands occur, or where conditions for control are not ideal and to control perennial herbaceous weeds from emergence up to the appearance of seedheads, flowers or berries. Use a lower rate in the rate range to control annual herbaceous weeds and actively growing perennial herbaceous weeds after seedheads, flowers or berries appear. Apply to foliage of actively growing annual herbaceous weeds anytime after emergence.

Tank Mixing for Noncrop Areas
This product may be used in tank mix combination with other herbicide products to broaden the spectrum of vegetation controlled. When tank mixing, read and observe applicable use directions, precautions and limitations on the respective product labels. Use according to the most restrictive precautionary statements for each product in the mixture. Any specified rate of this product may be used in a tank mix.

Maintain good agitation at all times during the mixing process and application. Ensure that the tank mix product(s) is well mixed with the spray solution before adding this product. Mix only the amount of spray solution that will be used during the same day. Reduced weed control may result if a tank mixture is allowed to stand overnight. If the spray mix is allowed to settle, thorough agitation is required to resuspend the mixture before spraying is resumed.

Weed Control, Trim and Edge, and Bare Ground
This product may be used in general noncrop and non-food areas. It may be applied with any application equipment described in this label. This product may be used to trim and edge around objects in noncrop sites, for spot treatment of unwanted vegetation, and to eliminate unwanted weeds growing in established shrub beds or ornamental plantings. This product may be used prior to planting an area to ornamentals, flowers, turfgrass (sod or seed), or prior to laying asphalt or beginning construction projects.

To maintain bare ground, repeated applications of this product may be used.

This product provides control of emerged annual weeds and control or partial control of emerged perennial weeds, woody brush and trees when applied in a tank mix to bare ground.

Turfgrass Renovation, Seed or Sod Production

This product controls most existing vegetation prior to renovating turfgrass areas or establishing turfgrass grown for seed or sod. For maximum control of existing vegetation, delay planting or sodding to determine if any regrowth from escaped underground plant parts occurs. When repeat treatments are necessary, sufficient regrowth must be attained prior to application. For warm season turfgrass, including bermudagrass, summer or fall applications provide the best control. Where existing vegetation is growing under mowed turfgrass management, apply this product after omitting at last one regular mowing to allow sufficient grown for good interception of the spray.

Do not disturb soil or underground plant parts before treatment. Delay tillage or renovation techniques, including vertical mowing, coring, or slicing, for seven days after application to allow translocation into underground plant parts.

Desirable turfgrass may be planed following the above procedures.

Hand-held equipment may be used for spot treatment of unwanted vegetation growing in existing turfgrass. Broadcast or hand-held equipment may be used to control sod remnants or other unwanted vegetation after sod is harvested.

Do not feed or graze turfgrass grown for seed or sod production for eight weeks following application.

Ornamentals and Plant Nurseries

Post-Direct and Trim and Edge
This product may be used as a post-directed spray around established woody ornamental species, including arborvitae, azalea, boxwood, crabapple, euonymus, fir, Douglas fir, jojoba, hollies, lilac, magnolia, maple, oak, provet, pine, spruce and yew. This product may also be used to trim and edge around trees, buildings, sidewalks and roads, potted plants and other objects in a nursery setting.

Desirable plants may be protected from the spray solution by using shields or coverings made of cardboard or other impermeable material. Do not use this product for any over the top broadcast spray in ornamentals. Exercise care to avoid contact of spray, drift or mist with foliage or green bark of established ornamental species.

Site Preparation
This product may be used prior to planting any ornamental, nursery or Christmas tree species.

Greenhouse/Shadehouse
This product may be used to control weeds growing in and around greenhouses and shadehouses. Desirable vegetation must not be present during application and air circulation fans must be turned off.

Wildlife Habitat Management

This product may be used to control exotic and other undesirable vegetation in habitat management and natural areas, including rangeland and wildlife refuges. Apply to allow recovery of native plant species, prior to planting desirable native species, and for broad spectrum vegetation control. Apply spot treatments to selectively remove unwanted plants for habitat enhancement.

Wildlife Food Plots
This product may be used as a site preparation treatment to control annual and perennial weeds prior to planting wildlife food plots. Any wildlife food species may be planted after applying this product, or native species may be allowed to repopulate the area. If tillage is needed to prepare a seedbed, wait 7 days after application before tilling to allow translocation into underground plant parts.

Hollow Stem Injection

Apply this product to control giant knotweed (*Polygonum sachalinense*), Japanese knotweed (*Polygonum cuspidatum*), or other invasive knotweeds using individual stem treatment. Use a hand-held injection device that delivers the specified amount of this product into these hollow stem plants.

Make a hole through both sides of the stem about 6 inches above the ground, just below a node, using an awl or other pointed tool. Inject 5 mL of undiluted product directly into this hole in the hollow stem. Treat each stem of the knotweed plant.

Restrictions:

- Do not apply more than a total of 8 quarts of this product per acre for all treatments combined. At 5 mL per stem, 8 quarts will treat approximately 1420 stems per acre.

Parks, Recreational and Residential Areas

Use this product in parks, recreational and residential areas. Apply it with any application equipment described in this label. Use this product to trim and edge around trees, fences, paths, around buildings, sidewalks, and other objects in these areas. This product may be used for spot treatment of unwanted vegetation, eliminate unwanted weeds growing in established shrub beds or ornamental plantings, and prior to planting an area to ornamentals, flowers, turfgrass (sod or seed), or prior to laying asphalt or beginning construction projects.

All of the label instructions apply to park and recreational areas.

Railroads

All of the instructions in the Noncrop Areas and Industrial Sites and Roadside sections apply to railroads.

Bare Ground, Ballast and Shoulders, Crossings, and Spot Treatment
Use this product to maintain bare ground on railroad ballast and shoulders. Repeat applications of this product may be used as weeds emerge to maintain bare ground. Use this product to control tall growing weeds to improve line of sight at railroad crossings and reduce the need for mowing along rights-of-way.

Brush Control
Apply 3 to 8 quarts of this product per acre as a broadcast spray, using boom-type or boomless nozzles. Applications up to 80 gallons of spray solution per acre may be used. Apply a 3/4 to 1.5 percent solution of this product when using high volume spray to wet applications. Apply a 5 to 10 percent solution of this product when using low volume directed sprays for spot treatment.

Roadsides

All of the instructions in the Noncrop Areas and Industrial Sites and Railroads sections apply to roadsides.

Shoulder Treatments
Use this product on road shoulders. Apply it with boom sprayers, shielded boom sprayers, high volume off-center nozzles, OC nozzle clusters, manifold nozzle systems, hand-held equipment, and similar equipment, and under-deck mowing plus herbicide systems..

Guardrails and Other Obstacles to Mowing
Use this product to control weeds growing under guardrails and around signposts and other objects along the roadside.

Spot Treatment
Use this product as a spot treatment to control unwanted vegetation growing along roadsides.

Tank Mixes: This product may be used in tank mix combination with other herbicide products to broaden the spectrum of vegetation controlled and for residual weed control. Follow applicable use directions, precautions and limitations on the respective product labels. Use according to the most restrictive precautionary statements for each product in the mixture. Any specified rate of this product may be used in a tank mix.

Chemical Mowing
Perennials: This product suppresses perennial grasses listed in this section to serve as a substitute for mowing. Use 4.5 fl oz of this product per acre when treating Kentucky bluegrass, tall fescue, fine fescue, orchardgrass, or quackgrass. Apply 12 fl oz of this product per acre when treating bermudagrass. Apply 4.5 to 8 fl oz of this product per acre when treating bahiagrass. Use the higher rates when grass is under heat stress. Apply 3 pints of this product per acre when treating torpedograss or paragrass. Apply treatments in 10 to 20 gallons of spray solution per acre.

Annuals: For growth suppression of some annual grasses, including annual ryegrass, wild barley and wild oats growing in coarse turfgrass on roadsides or other industrial areas, apply 3 to 3.75 fl oz of this product in 10 to 40 gallons of spray solution per acre. Apply when annual grasses are actively growing and before the seedheads are in the boot stage of development. Treatments may cause injury to the desired grasses.

Release of Dormant Bermudagrass or Bahiagrass
Apply 6 to 48 fl oz of this product per acre in 10 to 40 gallons of water per acre. Use only in areas where bermudagrass or bahiagrass are desirable groundcovers and where some temporary injury or discoloration can be tolerated. Treatments of more than 12 fl oz per acre may result in injury or delayed greenup in highly maintained areas, including golf courses and lawns.

For best results on winter annuals, treat when weeds are in an early growth stage (less than 6 inches in height) after most have germinated. For best results on tall fescue, treat when fescue is in or beyond the 4- to 6-leaf stage.

Tank Mixes: This product may be used in tank mix combination with other herbicide products to broaden the spectrum of vegetation controlled and for residual weed control. When tank mixing, read and follow all applicable use directions, precautions, and limitation on the respective product labels. Use according to the most restrictive precautionary statements for each product in the mixture. Any specified rate of this product may be used in a tank mix.

Actively Growing Bermudagrass
Use this product to control or partially control many annual and perennial weeds for effective release of actively growing bermudagrass. Use only in areas where some temporary injury or discoloration can be tolerated. Use only on well-established bermudagrass. Bermudagrass injury may result from the treatment, but regrowth will occur under moist conditions. Repeat applications of the tank mix in the same season are not specified since severe injury may occur.

Apply up to 2.25 pints of this product in 10 to 40 gallons of spray solution per acre. Use the lower rate when treating annual weeds less than 6 inches in height (or runner length). Use the higher rate as weeds increase in size or as they approach flower or seedhead formation.

Actively Growing Bahiagrass
For suppression of vegetable growth and seedhead inhibition of bahiagrass for approximately 45 days, apply 4.5 fl oz of this product in 10 to 40 gallons of water per acre. Apply one to two weeks after full greenup or after mowing to a uniform height of 3 to 4 inches. Make this application prior to seedhead emergence. For suppression up to 120 days, apply 3 fl oz of this product per acre, followed by an application of 1.5 to 3 fl oz per acre about 45 days later. Make no more than two applications per year.

Tank Mixes: This product may be used in tank mix combination with other herbicide products to broaden the spectrum of vegetation controlled and for residual weed control. When tank mixing, read and follow all applicable use directions, precautions, and limitation on the respective product labels. Use according to the most restrictive precautionary statements for each product in the mixture. Any specified rate of this product may be used in a tank mix.

Utility Sites

Use this product for control of brush, tree, and weed control and side trimming in areas including electrical power, pipeline and telephone rights-of-ways, and other sites associated with these rights-of-ways including substations, roadsides, and railroads. this product may be applied with any application equipment or method described on this label unless specifically prohibited.

Tank Mixes: This product may be used in tank mix combination with other herbicide products to broaden the spectrum of vegetation controlled and for residual weed control. When tank mixing, read and follow all applicable use directions, precautions, and limitation on the respective product labels. Use according to the most restrictive precautionary statements for each product in the mixture. Any specified rate of this product may be used in a tank mix.

Rangelands

Use this product to control or suppress many annual weeds growing in perennial cool and warm season grass rangelands. Preventing weed seed production is critical to the successful control of annual grassy weeds invading these perennial grass sites. Eliminate most of the viable seeds with follow up applications in sequential years. Delay grazing of treated areas to encourage growth of desirable perennials. Allowing desirable perennials to flower and reseed in the treated area will encourage successful transition.

***Bromus*:** Use this product to control or suppress downy brome/ cheatgrass (*Bromus tectorum*), Japanese brome (*Bromus japonicus*), soft chess (*Bromus mollis*), cheat (*Bromus secalinus*), cereal rye and jointed goatgrass. Apply 6 to 12 fl oz of this product per acre as a broadcast treatment.

For best results, coincide treatments with early seedhead emergence of the most mature plants. Delaying the application until this growth stage maximizes the emergence of other weedy grass flushes. Make applications to the same site each year until seed banks are depleted and the desirable perennial grasses become established on the site.

Medusahead: Apply 12 fl oz of this product per acre to control or suppress medusahead at the 3-leaf stage when plants are actively growing. Delaying applications beyond this stage results in reduced or unacceptable control. Repeat applications in subsequent years to eliminate the seed bank before reestablishing desirable perennial grasses. Apply in the fall or spring.

Apply by ground or air. Make aerial applications for these uses with fixed wing or helicopter equipment. For aerial applications, apply in 2 to 10 gallons of water per acre. For ground applications, apply in at least 10 to 20 gallons of water per acre.

Spot Treatment and Wiper Application
Apply this product in rangeland, pastures, or industrial sites as a spot treatment or over the top of desirable grasses using wiper applicators to control tall weeds. See Wiper Application section for specific instructions. Make repeat applications in the same area at 30-day intervals.

The entire site or any portion of it may be treated when using 2.25 quarts or less of this product per acre for spot treatments or wiper applications. No more than 10 percent of the total site may be treated at any one time when using more than 2.25 quarts of this product per acre for spot treatments or wiper applications. To achieve maximum performance, remove domestic livestock before application and wait 7 days after application before grazing livestock or harvesting for feed.

Pastures

Type of Pastures: Bahiagrass, bermudagrass, bluegrass, brome, fescue, orchardgrass, ryegrass, timothy, wheatgrass, alfalfa, clover

Spot Treatment and Wiper Application
This product may be applied as a spot treatment or as a wiper application. Make applications in the same area at 30-day intervals. See Wiper Application section for specific instructions.

Precautions and Restrictions:
- For spot treatment and wiper applications, the entire field or any portion of it may be treated when using a rate of 2.25 quarts or less per acre.
- Do not treat more than 10 percent of any acre at one time if applying more than 2.25 quarts per acre as a spot treatment or wiper application.
- To achieve maximum performance, remove domestic livestock before application and wait 14 days after application before grazing livestock or harvesting.

Preplant, Preemergence, and Pasture Renovation
Apply this product prior to planting or emergence of forage grasses and legumes. In addition, this product may be used to control perennial pasture species listed on this label prior to re-planting.

Precautions and Restrictions:
- If the application rates total 2.25 quarts or less per acre, there is no waiting period between treatment and feeding or livestock grazing is required.
- If the application rates total more than 2.25 quarts per acre, remove domestic livestock before application and wait eight weeks after application before grazing or harvesting.
- Crops listed for treatment in this label may be planted into the treated area at any time. Wait 30 days between application and planting for all other crops.

Bamboo

Use this product on roadside rights-of way to control or suppress bamboo. Use the higher rate in the rate range for dense stands and larger plants. Mow or cut bamboo and allow it to resprout to have sufficient foliage in order for the spray solution to completely cover the foliage. Optimum control or suppression of bamboo is achieved when this product is applied between August and October (prior to frost). One application of this product plus a surfactant will not eradicate bamboo. Several mowings and applications are required to completely control bamboo.

Apply the specified rate plus a surfactant (1/4 to 1/2% v/v), such as a nonionic surfactant containing 80% active ingredient or more. Using this product without a surfactant results in reduced performance.

Application Method	Rate	Spray Volume (gal/acre)
ground broadcast	1.5 – 7.5 qt/acre	10 - 60
handgun spray to wet	0.75 – 2%	spray to wet
handgun or backpack low volume directed spray	4 – 10%	spray to cover

Restrictions:
- Do not apply more than a total of 8 quarts of this product per acre per year.

Annual Weeds, Perennial Weeds, and Woody Brush and Trees

Annual Weeds
Apply 24 fl oz of this product per acre if weeds are less than 6 inches in height or runner length. Use 1.25 to 3 quarts of this product per acre if weeds are more than 6 inches in height or runner length or when weeds are growing under stressed conditions. Use a higher rate in the rate range for tough to control species regardless of the size of the weed at the time of application. Treat tough to control weeds when they are relatively small. Tank mix this product with only those products that are labeled for application at the target site. Refer to the label of the tank mix partner for use sites and application rates.

Apply a 0.4 percent solution of this product as a spray to wet application to weeds less than 6 inches in height or runner length. Use a 0.7 to 1.5 percent solution for annual weeds more than 6 inches tall or for smaller weeds growing under stressed conditions. Use the higher concentration for tough to control species or for weeds more than 24 inches tall. Apply prior to seedhead formation in grass or bud formation in broadleaf weeds.

Use a 4 to 7 percent solution of this product for low volume directed spray applications. Spray coverage should be uniform with at least 50 percent of the foliage contacted. For best results, cover the top one-half of the plant. To ensure adequate spray coverage, spray both sides of large or tall weeds when foliage is thick and dense or where there are multiple sprouts.

Common Name	Scientific Name
anoda, spurred	*Anoda cristata*
balsamapple[1]	*Momordica charantia*
barley	*Hordeum vulgare*
barnyardgrass	*Echinochloa crus-galli*
bassia, fivehook	*Bassia hyssopifolia*
bittercress	*Cardamine* spp.
bluegrass, annual	*Poa annua*
bluegrass, bulbous	*Poa bulbosa*
brome, downy/cheatgrass	*Bromus tectorum*
brome, Japanese	*Bromus japonicus*
buttercup	*Ranunculus spp.*
Carolina foxtail	*Alopecurus carolinianus*
Carolina geranium	*Geranium carolinianum*
castorbean	*Ricinus communis*
chamomile, mayweed	*Anthemis cotula*
cheat	*Bromus secalinus*
chervil	*Anthriscus cerefolium*
chickweed	*Cerastium vulgatum*
cocklebur, common	*Xanthium strumarium*
coreopsis, plains	*Coreopsis tinctoria*
corn, volunteer	*Zea mays*
crabgrass	*Digitaria* spp.
dwarfdandelion, Virginia	*Krigia virginica*
eastern mannagrass	*Glyceria* spp.
eclipta	*Eclipta prostrata*
falsedandelion	*Pyrrhopappus carolinianus*
falseflax, smallseed	*Camelina microcarpa*
fiddleneck	*Amsinckia* spp.
field pennycress	*Thlaspi arvense*
fleabane, annual	*Erigeron annuus*
fleabane, hairy	*Conyza bonariensis*
fleabane, rough	*Erigeron strigosus*
Florida pusley	*Richardia scabra*
foxtail	*Setaria* spp.
goatgrass, jointed	*Aegilops cylindrica*
goosegrass	*Eleusine indica*
groundsel, common	*Senecio vulgaris*
henbit	*Lamium amplexicaule*
horseweed/marestail	*Conyza canadensis*
itchgrass	*Rottboellia cochinchinensis*
johnsongrass	*Sorghum halepense*
junglerice	*Echinochloa colona*
knotweed	*Polygonum* spp.
kochia[2]	*Kochia scoparia*
lambsquarters, common	*Chenopodium album*
mallow, little	*Malva parviflora*
medusahead	*Taeniatherum caput-medusae*
morningglory	*Ipomoea* spp.
mustard, blue	*Chorispora tenella*
mustard, tumble	*Sisymbrium altissimum*
mustard, wild	*Sinapis arvensis*
oats, wild	*Avena fatua*
panicum, fall	*Panicum dichotomiflorum*
pigweed, redroot	*Amaranthus retroflexus*
pigweed, smooth	*Amaranthus hybridus*
prickly lettuce	*Lactuca serriola*

Common Name (Cont.)	Scientific Name
puncturevine	*Tribulus terrestris*
purslane, common	*Portulaca oleracea*
ragweed, common	*Ambrosia artemisiifolia*
ragweed, giant	*Ambrosia trifida*
rocket, London	*Sisymbrium irio*
Russian-thistle	*Salsola tragus*
rye, cereal	*Secale cereale*
ryegrass, Italian[3]	*Lolium perenne*
sandbur, field	*Cenchrus spinifex*
sesbania, hemp	*Sesbania herbacea*
shattercane	*Sorghum bicolor*
shepherd's-purse	*Capsella bursa-pastoris*
sicklepod	*Senna obtusifolia*
signalgrass, broadleaf	*Urochloa platyphylla*
smartweed, Pennsylvania	*Polygonum pensylvanicum*
sowthistle, annual	*Sonchus oleraceus*
Spanishneedles[3]	*Bidens bipinnata*
speedwell, corn	*Veronica arvensis*
speedwell, purslane	*Veronica peregrina*
sprangletop	*Leptochloa* spp.
spurge, annual	*Chamaesyce* spp.
spurge, prostrate	*Chamaesyce humistrata*
spurge, spotted	*Chamaesyce maculata*
spurry, umbrella	*Holosteum umbellatum*
stinkgrass	*Eragrostis cilianensis*
sunflower, common	*Helianthus annuus*
tansymustard, pinnate	*Descurainia pinnata*
teaweed/sida, prickly	*Sida spinosa*
Texas panicum	*Panicum* spp.
velvetleaf	*Abutilon theophrasti*
Virginia pepperweed	*Lepidium virginicum*
wheat	*Triticum aestivum*
witchgrass	*Panicum capillare*
woolly cupgrass	*Eriochloa villosa*
yellow rocket	*Barbarea vulgaris*

[1]Apply with hand-held equipment only.
[2]Do not treat kochia in the button stage.
[3]Apply 3 pints of product per acre.

Perennial Weeds
Best results are obtained when perennial weeds are treated after they reach the reproductive stage of growth (seedhead initiation in grasses and bud formation in broadleaves). Best results are obtained when non-flowering plants are treated when they reach a mature stage of growth. In many situations, applications are required prior to these growth stages. Under these conditions, use a higher rate in the rate range.

When using spray to wet treatments with hand-held equipment, ensure thorough coverage of the plant. For best results, use a 1.5 percent solution on harder to control perennials including bermudagrass, dock, field bindweed, hemp dogbane, milkweed and Canada thistle.

Use a 4 to 7 percent solution of this product in low volume directed spray applications. Spray coverage should be uniform with at least 50 percent of the foliage contacted. For best results, cover the top one-half of the plant. To ensure adequate spray coverage, spray both sides of large or tall weeds when foliage is thick and dense or where there are multiple sprouts.

Allow 7 days or more after application before tillage.

Common Name	Scientific Name
alfalfa	*Medicago sativa*
alligatorweed[1]	*Alternanthera philoxeroides*
anise/fennel	*Foeniculum vulgare*
artichoke, Jerusalem	*Helianthus tuberosus*
bahiagrass	*Paspalum notatum*
beachgrass, European	*Ammophila arenaria*
bentgrass	*Agrostis* spp.
bermudagrass	*Cynodon dactylon*
bindweed, field	*Convolvulus arvensis*
bluegrass, Kentucky	*Poa pratensis*
blueweed, Texas	*Helianthus ciliaris*
brackenfern	*Pteridium aquilinum*
brome, smooth	*Bromus inermis*
bursage, woollyleaf	*Ambrosia grayi*
canarygrass, reed	*Phalaris arundinacea*
cattail	*Typha* spp.
clover, red	*Trifolium pratense*
clover, white	*Trifolium repens*
cogongrass	*Imperata clylindrica*
cordgrass	*Spartina spp.*
cutgrass, giant[1]	*Zizaniopsis miliacea*
dallisgrass	*Paspalum dilatatum*
dandelion	*Taraxacum officinale*
dock, curly	*Rumex crispus*
dogbane, hemp	*Apocynum cannabinum*
fescue	*Festuca* spp.
fescue, tall	*Lolium arundinaceum*
German ivy	*Senecio mikanioides*
guineagrass	*Urochloa maxima*
horsenettle	*Solanum carolinense*
horseradish	*Armoracia rusticana*
iceplant, crystalline	*Mesembryanthemum crystallinum*
johnsongrass	*Sorghum halepense*
kikuyugrass	*Pennisetum clandestinum*
knapweed, Russian	*Acroptilon repens*
lantana, largeleaf	*Lantana camara*
lespedeza, common	*Kummerowia striata*
lespedeza, sericea	*Lespedeza cuneata*
loosestrife, purple	*Lythrum salicaria*
lotus, American	*Nelumbo lutea*
maidencane	*Panicum hemitomon*
milkweed	*Asclepias* spp.
muhly, wirestem	*Muhlenbergia frondosa*
mullein, common	*Verbascum thapsus*
napiergrass	*Pennisetum purpureum*
nightshade, silverleaf	*Solanum elaeagnifolium*
nutsedge, purple	*Cyperus rotundus*
nutsedge, yellow	*Cyperus esculentus*
orchardgrass	*Dactylis glomerata*
pampasgrass	*Cortaderia selloana*
paragrass	*Urochloa mutica*
phragmites[2]	*Phragmites* spp.
poison-hemlock	*Conium maculatum*
quackgrass	*Elymus repens*
redvine	*Brunnichia ovata*
reed, giant	*Arundo donax*
ryegrass, perennial	*Lolium perenne*
smartweed, swamp	*Polygonum amphibium*
sowthistle, perennial	*Sonchus arvensis*
spatterdock	*Nuphar lutea*
starthistle, yellow	*Centaurea solstitialis*
sweet potato, wild[1]	*Ipomoea pandurata*
thistle, artichoke	*Cynara cardunculus*
thistle, Canada	*Cirsium arvense*
timothy	*Phleum pratense*
torpedograss[1]	*Panicum repens*
trumpetcreeper	*Campsis radicans*
tules, common	*Scirpus acutus*
vaseygrass	*Paspalum urvillei*
velvetgrass	*Holcus* spp.
waterhyacinth	*Eichornia crassipes*
waterlettuce	*Pistia stratiotes*
waterprimrose	*Ludwigia* spp.
wheatgrass, western	*Pascopyrum smithii*

[1] Partial control.
[2] Partial control in southeastern states.

Woody Brush and Trees
Apply this product after full leaf expansion unless otherwise directed. Use the higher rate for larger plants and/or dense areas of growth. On vines, use the higher rate for plants that have reached the woody stage of growth. Best results are obtained when application is made in late summer or fall after fruit formation.

In arid areas, best results are obtained when applications are made in the spring or early summer when brush species are at high moisture content and are flowering.

Ensure thorough coverage when using hand-held equipment.

See Low Volume Directed Spray Application section of label. Spray coverage should be uniform with at least 50 percent of the foliage contacted. For best results, cover the top half to 2/3 of the plant foliage. Spray both sides of large or tall woody brush and trees to ensure adequate spray coverage when foliage is thick and dense or where there are multiple sprouts. Symptoms may not appear prior to frost or senescence with fall treatments.

Allow seven days or more after application before tillage, mowing or removal. Repeat treatments may be necessary to control plants regenerating from underground parts or seed. Some autumn colors on undesirable deciduous species are acceptable provided no major leaf drop has occurred. Reduced performance may result if fall treatments are made following a frost.

Note: If brush has been mowed or tilled, or trees have been cut, do not treat until regrowth has reached the specified stage of growth.

This product will control, partially control, or suppress the following woody brush and trees.

Common Name	Scientific Name
alder	*Alnus* spp.
ash[1]	*Fraxinus* spp.
aspen, quaking	*Populus tremuloides*
bearclover, bearmat	*Ceanothus prostratus*
beach	*Fagus* spp.
birch	*Betula* spp.
bittercherry	*Prunus emarginata*

Common Name (Cont.)	Scientific Name
blackberry	*Rubus* spp.
blackgum	*Nyssa sylvatica*
blue gum, Tasmanian	*Eucalyptus globulus*
brackenfern	*Pteridium aquilinum*
broom, French	*Genista monspessulana*
broom, Scotch	*Cytisus scoparius*
buckwheat, California[1]	*Eriogonum fasciculatum*
cascara[1]	*Frangula purshiana*
catclaw-vine[1]	*Macfadyena unguis-cati*
ceanothus	*Ceanothus* spp.
chamise	*Adenostoma fasciculatum*
cherry	*Prunus* spp.
cherry, black	*Prunus serotina*
cherry, pin	*Prunus pensylvanica*
copperleaf, hophornbeam	*Acalypha ostryifolia*
coyotebrush	*Baccharis pilularis*
deer vetch	*Lotus unifoliolatus*
dewberry, southern	*Rubus trivialis*
dogwood	*Cornus* spp.
elderberry	*Sambucus nigra*
elm[1]	*Ulmus* spp.
gorse	*Ulex europaeus*
hasardia[1]	*Haplopappus squamosus*
hawthorn	*Crataegus* spp.
hazel	*Corylus* spp.
hickory	*Carya* spp.
holly, Florida	*Schinus terebinthifolius*
honeysuckle	*Lonicera* spp.
hornbeam, American	*Carpinus caroliniana*
kudzu	*Pueraria montana*
locust, black[1]	*Robinia pseudoacacia*
madrone, Pacific	*Arbutus menziesii*
manzanita	*Arctostaphylos* spp.
maple	*Acer* spp.
maple, red[1]	*Acer rubrum*
maple, sugar	*Acer saccharum*
maple, vine[1]	*Acer circinatum*
monkeyflower[1]	*Mimulus guttatus*
oak	*Quercus* spp.
oak, black[1]	*Quercus kellogia*
oak, pin	*Quercus palustris*
oak, post	*Quercus stellata*
oak, red	*Quercus rubra*
oak, southern red	*Quercus falcata*
oak, white[1]	*Quercus alba*
peppertree, Brazilian	*Schinus terebinthifolius*
persimmon[1]	*Diospyros* spp.
pine	*Pknus* spp.
poison-ivy, eastern	*Toxicodendron radicans*
poison-oak	*Toxicodendron* spp.
poison-sumac[1]	*Toxicodendron vernix*
prunus	*Prunus* spp.
raspberry	*Rubus* spp.
redbud, eastern	*Cercis canadensis*
rose, multiflora	*Rosa multiflora*
Russian-olive	*Elaeagnus angustifolia*
sage,: black, white	*Salvia* spp.
sagebrush, California	*Artemisia californica*
salmonberry	*Rubus spectabilis*
saltcedar[1]	*Tamarix ramosissima*
saltbush, sea myrtle	*Baccharis halimifolia*
sassafras	*Sassafras albidum*
sourwood[1]	*Oxydendrum arboreum*
sumac, smooth[1]	*Rhus glabra*
sumac, dwarf[1]	*Rhus copallinum*
sweetgum	*Liquidambar styraciflua*
swordfern[1]	*Polystichum munitum*
tallowtree, Chinese	*Triadica sebifera*
oak, tanbark resprouts	*Lithocarpus densiflorus*
thimbleberry, western	*Rubus parviflorus*
tobacco, tree[1]	*Nicotiana glauca*
trumpetcreeper	*Campsis radicans*
Virginia-creeper[1]	*Parthenocissus quinquefolia*
waxmyrtle, southern[1]	*Myrica cerifera*
willow	*Salix* spp.
yellow-poplar [1]	*Liriodendron tulipifera*
yerba santa	*Eriodictyon californicum*

[1]Partial control

Terms and Conditions of Use

If terms of the following Warranty Disclaimer, Inherent Risks of Use, and Limitation of Remedies are not acceptable, return unopened package at once to the seller for a full refund of purchase price paid. Otherwise, use by the buyer or any other user constitutes acceptance of the terms under Warranty Disclaimer, Inherent Risks of Use and Limitations of Remedies.

Warranty Disclaimer

Dow AgroSciences warrants that this product conforms to the chemical description on the label and is reasonably fit for the purposes stated on the label when used in strict accordance with the directions, subject to the inherent risks set forth below. Dow AgroSciences MAKES NO OTHER EXPRESS OR IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR ANY OTHER EXPRESS OR IMPLIED WARRANTY.

Inherent Risks of Use

It is impossible to eliminate all risks associated with use of this product . Crop injury, lack of performance, or other unintended consequences may result because of such factors as use of the product contrary to label instructions (including conditions noted on the label, such as unfavorable temperatures, soil conditions, etc.), abnormal conditions (such as excessive rainfall, drought, tornadoes, hurricanes), presence of other materials, the manner of application, or other factors, all of which are beyond the control of Dow AgroSciences or the seller. To the extent permitted by law, all such risks shall be assumed by buyer.

Limitation of Remedies

The exclusive remedy for losses or damages resulting from this product (including claims based on contract, negligence, strict liability, or other legal theories), shall be limited to, at Dow AgroSciences' election, one of the following:

(1) Refund of purchase price paid by buyer or user for product bought, or
(2) Replacement of amount of product used.

Dow AgroSciences shall not be liable for losses or damages resulting from handling or use of this product unless Dow AgroSciences is promptly notified of such loss or damage in writing. To the fullest extent permitted by law, in no case shall Dow AgroSciences be liable for consequential or incidental damages or losses.

The terms of the Warranty Disclaimer, Inherent Risks of Use, and Limitation of Remedies cannot be varied by any written or verbal statements or agreements. No employee or sales agent of Dow AgroSciences or the seller is authorized to vary or exceed the terms of the Warranty Disclaimer or Limitation of Remedies in any manner.

Produced for
Dow AgroSciences LLC
9330 Zionsville Road
Indianapolis, IN 46268

Label Code: D02-148-006
Replaces Label: D02-148-005
LOES Number: 010-01471

EPA accepted 07/07/11

Revisions

1. Added resistance management section.
2. Added use directions for Christmas tree plantations; mid-rotation conifer release and spot treatments for crop tree release and timber stand improvement; noncrop areas and industrial sites; turfgrass renovation, seed or sod production; ornamentals and plant nurseries; hollow stem injection; parks; recreational and residential areas; roadsides; rangelands; pastures; bamboo.
3. Added Brazilian peppertree and Australian-pine to cut stump.
4. Added spurred anoda, bittercress, Japanese brome, Carolina geranium, castorbean, mayweed chamomile, chervil, plains coreopsis, eastern mannagrass, eclipta, falsedandelion, hairy fleabane, rough fleabane, Florida pusley, jointed goatgrass, goosegrass, henbit, itchgrass, johnsongrass, junglerice, knotweed, little mallow, medusahead, smooth pigweed, puncturevine, common purslane, hemp sesbania, sicklepod, corn speedwell, purslane speedwell, sprangletop, annual spurge, prostrate spurge, spotted spurge, teaweed/prickly sida, Virginia pepperweed, woolly cupgrass, and yellow rocket to annual weeds.
5. Added European beachgrass, bentgrass, woollyleaf bursage, German ivy, redvine, perennial sowthistle, and trumpetcreeper to perennial weeds.
6. Added beach, blackgum, brackenfern, cherry, hophornbeam copperleaf, deer vetch, gorse, Pacific madrone, maple, oak, Brazilian peppertree, pine, tanbark oak resprouts, and yerba santa to woody brush and trees.

Dow AgroSciences LLC encourages and expects you to read and understand the entire (M)SDS, as there is important information throughout the document. We expect you to follow the precautions identified in this document unless your use conditions would necessitate other appropriate methods or actions.

1. Product and Company Identification

Product Name
RODEO Herbicide

COMPANY IDENTIFICATION
Dow AgroSciences LLC
A Subsidiary of The Dow Chemical Company
9330 Zionsville Road
Indianapolis, IN 46268-1189
USA

Customer Information Number: 800-992-5994
SDSQuestion@dow.com

EMERGENCY TELEPHONE NUMBER

24-Hour Emergency Contact: 800-992-5994
Local Emergency Contact: 352-323-3500

2. Hazards Identification

Emergency Overview
Color: Yellow
Physical State: Liquid.
Odor: Odorless
Hazards of product:

CAUTION! Combustible liquid and vapor. Vapor explosion hazard. Vapors may travel a long distance; ignition and/or flash back may occur. Isolate area. Stay out of low areas. Warn public of downwind explosion hazard. Eliminate ignition sources.

OSHA Hazard Communication Standard
This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

Potential Health Effects
Eye Contact: May cause slight temporary eye irritation. Corneal injury is unlikely.
Skin Contact: Essentially nonirritating to skin.
Skin Absorption: Prolonged skin contact is unlikely to result in absorption of harmful amounts.

Inhalation: Brief exposure (minutes) is not likely to cause adverse effects.
Ingestion: Very low toxicity if swallowed. Harmful effects not anticipated from swallowing small amounts.
Effects of Repeated Exposure: For similar material(s): Glyphosate. In animals, effects have been reported on the following organs: Liver.

3. Composition Information

Component	CAS #	Amount
Glyphosate IPA salt	38641-94-0	53.8 %
Isopropylamine	75-31-0	1.0 %
Balance	Not available	45.2 %

4. First-aid measures

Description of first aid measures

Inhalation: Move person to fresh air. If person is not breathing, call an emergency responder or ambulance, then give artificial respiration; if by mouth to mouth use rescuer protection (pocket mask etc). Call a poison control center or doctor for treatment advice.
Skin Contact: 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.
Eye Contact: Hold eyes 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 eyes. Call a poison control center or doctor for treatment advice.
Ingestion: No emergency medical treatment necessary.

Most important symptoms and effects, both acute and delayed

Aside from the information found under Description of first aid measures (above) and Indication of immediate medical attention and special treatment needed (below), no additional symptoms and effects are anticipated.

Indication of immediate medical attention and special treatment needed

No specific antidote. Treatment of exposure should be directed at the control of symptoms and the clinical condition of the patient. Have the Safety Data Sheet, and if available, the product container or label with you when calling a poison control center or doctor, or going for treatment.

5. Fire Fighting Measures

Suitable extinguishing media

To extinguish combustible residues of this product use water fog, carbon dioxide, dry chemical or foam. Dry chemical fire extinguishers. Carbon dioxide fire extinguishers. Foam. Straight or direct water streams may not be effective to extinguish fire. General purpose synthetic foams (including AFFF type) or protein foams are preferred if available. Alcohol resistant foams (ATC type) may function.

Special hazards arising from the substance or mixture

Hazardous Combustion Products: During a fire, smoke may contain the original material in addition to combustion products of varying composition which may be toxic and/or irritating.
Unusual Fire and Explosion Hazards: This material will not burn until the water has evaporated. Residue can burn. Container may vent and/or rupture due to fire. Electrically ground and bond all equipment. Flammable mixtures of this product are readily ignited even by static discharge. May produce flash fire. Vapors are heavier than air and may travel a long distance and accumulate in low lying areas. Ignition and/or flash back may occur. Flammable mixtures may exist within the vapor space of containers at room temperature.

Advice for firefighters

Fire Fighting Procedures: Keep people away. Isolate fire and deny unnecessary entry. Stay upwind. Keep out of low areas where gases (fumes) can accumulate. Water may not be effective in extinguishing fire. Eliminate ignition sources. Move container from fire area if this is possible without hazard. To extinguish combustible residues of this product use water fog, carbon dioxide, dry chemical or foam. Contain fire water run-off if possible. Fire water run-off, if not contained, may cause environmental damage. Review the "Accidental Release Measures" and the "Ecological Information" sections of this (M)SDS.
Special Protective Equipment for Firefighters: Wear positive-pressure self-contained breathing apparatus (SCBA) and protective fire fighting clothing (includes fire fighting helmet, coat, trousers, boots, and gloves). Avoid contact with this material during fire fighting operations. If contact is likely, change to full chemical resistant fire fighting clothing with self-contained breathing apparatus. If this is not available, wear full chemical resistant clothing with self-contained breathing apparatus and fight fire from a remote location. For protective equipment in post-fire or non-fire clean-up situations, refer to the relevant sections.

6. Accidental Release Measures

Personal precautions, protective equipment and emergency procedures: Isolate area. Refer to Section 7, Handling, for additional precautionary measures. Keep unnecessary and unprotected personnel from entering the area. Keep personnel out of low areas. No smoking in area. Eliminate all sources of ignition in vicinity of spill or released vapor to avoid fire or explosion. Vapor explosion hazard. Keep out of sewers. For large spills, warn public of downwind explosion hazard. Check area with combustible gas detector before reentering area. Ground and bond all containers and handling equipment. Use appropriate safety equipment. For additional information, refer to Section 8, Exposure Controls and Personal Protection.

Environmental precautions: Prevent from entering into soil, ditches, sewers, waterways and/or groundwater. See Section 12, Ecological Information.
Methods and materials for containment and cleaning up: Contain spilled material if possible. Pump with explosion-proof equipment. If available, use foam to smother or suppress. Absorb with materials such as: Clay. Dirt. Sand. Sweep up. Collect in suitable and properly labeled containers. Large spills: Contact Dow AgroSciences for clean-up assistance. See Section 13, Disposal Considerations, for additional information.

7. Handling and Storage

Handling
General Handling: Keep away from heat, sparks and flame. No smoking, open flames or sources of ignition in handling and storage area. Electrically bond and ground all containers and equipment before transfer or use of material. Use of non-sparking or explosion-proof equipment may be necessary, depending upon the type of operation. Containers, even those that have been emptied, can contain vapors. Do not cut, drill, grind, weld, or perform similar operations on or near empty containers. Vapors are heavier than air and may travel a long distance and accumulate in low lying areas. Ignition and/or flash back may occur. Never use air pressure for transferring product. Keep out of reach of children. Do not swallow. Avoid breathing vapor or mist. Avoid contact with eyes, skin, and clothing. Use with adequate ventilation. Wash thoroughly after handling. Keep container closed.

Storage
Minimize sources of ignition, such as static build-up, heat, spark or flame. Keep container closed. Do not store in: Carbon steel. Galvanized containers. Steel. Flammable mixtures may exist within the vapor space of containers at room temperature. Store in a dry place. Store in original container. Do not store near food, foodstuffs, drugs or potable water supplies.

8. Exposure Controls / Personal Protection

Exposure Limits

Component	List	Type	Value
Isopropylamine	ACGIH	TWA	5 ppm
	ACGIH	STEL	10 ppm
	OSHA Table Z-1	PEL	12 mg/m3 5 ppm

RECOMMENDATIONS IN THIS SECTION ARE FOR MANUFACTURING, COMMERCIAL BLENDING AND PACKAGING WORKERS. APPLICATORS AND HANDLERS SHOULD SEE THE PRODUCT LABEL FOR PROPER PERSONAL PROTECTIVE EQUIPMENT AND CLOTHING.

Personal Protection

Eye/Face Protection: Use safety glasses (with side shields).

Skin Protection: No precautions other than clean body-covering clothing should be needed.

Hand protection: Chemical protective gloves should not be needed when handling this material. Consistent with general hygienic practice for any material, skin contact should be minimized.

Respiratory Protection: Atmospheric levels should be maintained below the exposure guideline. When respiratory protection is required for certain operations, use an approved air-purifying respirator. The following should be effective types of air-purifying respirators: Organic vapor cartridge with a particulate pre-filter.

Ingestion: Use good personal hygiene. Do not consume or store food in the work area. Wash hands before smoking or eating.

Engineering Controls

Ventilation: Good general ventilation should be sufficient for most conditions. Local exhaust ventilation may be necessary for some operations.

9. Physical and Chemical Properties

Appearance	
Physical State	Liquid.
Color	Yellow
Odor	Odorless
Odor Threshold	No test data available
pH	4.6 (@ 1 %) *NAPM 11A.00* 1% aqueous solution.
Melting Point	Not applicable
Freezing Point	No test data available
Boiling Point (760 mmHg)	110 °C (230 °F) .
Flash Point - Closed Cup	> 93 °C (> 199 °F) *Setaflash Closed Cup ASTMD3828* none below boiling point
Evaporation Rate (Butyl Acetate = 1)	No test data available
Flammable Limits In Air	**Lower**: No test data available **Upper**: No test data available
Vapor Pressure	No test data available
Vapor Density (air = 1)	No test data available
Specific Gravity (H2O = 1)	1.211 22 °C/4 °C *Pyknometer*
Solubility in water (by weight)	Soluble
Autoignition Temperature	none below 400degC
Decomposition Temperature	No test data available
Dynamic Viscosity	64.6 mPa.s @ 20 °C
Kinematic Viscosity	53.4 mm2/s @ 20 °C
Liquid Density	1.20 g/ml @ 20 °C *Digital density meter*

10. Stability and Reactivity

Reactivity
No dangerous reaction known under conditions of normal use.
Chemical stability
Thermally stable at recommended temperatures and pressures.

Possibility of hazardous reactions
Polymerization will not occur.
Conditions to Avoid: Active ingredient decomposes at elevated temperatures. Avoid static discharge.

Incompatible Materials: Heat produced by the reaction with water will cause vaporization. Flammable hydrogen may be generated from contact with metals such as:
Hazardous decomposition products
Decomposition products depend upon temperature, air supply and the presence of other materials.

11. Toxicological Information

Acute Toxicity
Ingestion
LD50, Rat > 5,000 mg/kg
Dermal
LD50, Rabbit > 5,000 mg/kg
Inhalation
LC50, 4 h, Aerosol, Rat > 6.37 mg/l
Eye damage/eye irritation
May cause slight temporary eye irritation. Corneal injury is unlikely.
Skin corrosion/irritation
Essentially nonirritating to skin.
Sensitization
Skin
Did not cause allergic skin reactions when tested in guinea pigs.
Repeated Dose Toxicity
For similar material(s): Glyphosate. In animals, effects have been reported on the following organs: Liver.
Chronic Toxicity and Carcinogenicity
For similar material(s): Glyphosate. Did not cause cancer in laboratory animals.
Developmental Toxicity
For the active ingredient(s): Available data are inadequate for evaluation of potential to cause birth defects.
Reproductive Toxicity
For the active ingredient(s): Available data are inadequate to determine effects on reproduction.
Genetic Toxicology
For the active ingredient(s): In vitro genetic toxicity studies were negative in some cases and positive in other cases. For similar material(s): Glyphosate. In vitro genetic toxicity studies were negative. For similar material(s): Glyphosate. Animal genetic toxicity studies were negative.

12. Ecological Information

Toxicity
Material is practically non-toxic to aquatic organisms on an acute basis (LC50/EC50/EL50/LL50 >100 mg/L in the most sensitive species tested). Material is practically non-toxic to birds on an acute basis (LD50 > 2000 mg/kg).

Fish Acute & Prolonged Toxicity
LC50, rainbow trout (Oncorhynchus mykiss), 96 h: > 2,500 mg/l
Aquatic Invertebrate Acute Toxicity
EC50, water flea Daphnia magna, 48 h, immobilization: 918 mg/l
Aquatic Plant Toxicity
EC50, green alga Pseudokirchneriella subcapitata (formerly known as Selenastrum capricornutum), biomass growth inhibition, 72 h: 10 - 127 mg/l
Toxicity to Above Ground Organisms
oral LD50, bobwhite (Colinus virginianus): > 2,000 mg/kg
contact LD50, Honey bee (Apis mellifera): > 100 ug/bee
oral LD50, Honey bee (Apis mellifera): > 100 ug/bee

Persistence and Degradability

Based on stringent OECD test guidelines, this material cannot be considered as readily biodegradable; however, these results do not necessarily mean that the material is not biodegradable under environmental conditions. For similar active ingredient(s). Biodegradation may occur under aerobic conditions (in the presence of oxygen).

Bioaccumulative potential

Bioaccumulation: For similar active ingredient(s). Bioconcentration potential is low (BCF < 100 or Log Pow < 3).

Mobility in soil

Mobility in soil: For similar active ingredient(s)., Expected to be relatively immobile in soil (Koc > 5000).

13. Disposal Considerations

If wastes and/or containers cannot be disposed of according to the product label directions, disposal of this material must be in accordance with your local or area regulatory authorities. This information presented below only applies to the material as supplied. The identification based on characteristic(s) or listing may not apply if the material has been used or otherwise contaminated. It is the responsibility of the waste generator to determine the toxicity and physical properties of the material generated to determine the proper waste identification and disposal methods in compliance with applicable regulations. If the material as supplied becomes a waste, follow all applicable regional, national and local laws.

14. Transport Information

DOT Non-Bulk
NOT REGULATED

DOT Bulk
NOT REGULATED

IMDG
NOT REGULATED

ICAO/IATA
NOT REGULATED

This information is not intended to convey all specific regulatory or operational requirements/information relating to this product. Additional transportation system information can be obtained through an authorized sales or customer service representative. It is the responsibility of the

transporting organization to follow all applicable laws, regulations and rules relating to the transportation of the material.

15. Regulatory Information

OSHA Hazard Communication Standard

This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

Superfund Amendments and Reauthorization Act of 1986 Title III (Emergency Planning and Community Right-to-Know Act of 1986) Sections 311 and 312

Immediate (Acute) Health Hazard	No
Delayed (Chronic) Health Hazard	Yes
Fire Hazard	No
Reactive Hazard	No
Sudden Release of Pressure Hazard	No

Superfund Amendments and Reauthorization Act of 1986 Title III (Emergency Planning and Community Right-to-Know Act of 1986) Section 313

To the best of our knowledge, this product does not contain chemicals at levels which require reporting under this statute.

Pennsylvania (Worker and Community Right-To-Know Act): Pennsylvania Hazardous Substances List and/or Pennsylvania Environmental Hazardous Substance List:

The following product components are cited in the Pennsylvania Hazardous Substance List and/or the Pennsylvania Environmental Substance List, and are present at levels which require reporting.

Component	CAS #	Amount
Isopropylamine	75-31-0	1.0%

Pennsylvania (Worker and Community Right-To-Know Act): Pennsylvania Special Hazardous Substances List:

To the best of our knowledge, this product does not contain chemicals at levels which require reporting under this statute.

Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) Section 103

This product contains the following substances which are subject to CERCLA Section 103 reporting requirements and which are listed in 40 CFR 302.4.

Component	CAS #	Amount
Isopropylamine	75-31-0	1.0%

California Proposition 65 (Safe Drinking Water and Toxic Enforcement Act of 1986)

This product contains no listed substances known to the State of California to cause cancer, birth defects or other reproductive harm, at levels which would require a warning under the statute.

Toxic Substances Control Act (TSCA)

All components of this product are on the TSCA Inventory or are exempt from TSCA Inventory requirements under 40 CFR 720.30

16. Other Information

Hazard Rating System

NFPA	Health	Fire	Reactivity
	1	1	0

Revision

Identification Number: 61082 / 1016 / Issue Date 07/06/2011 / Version: 2.0
DAS Code: NAF-552
Most recent revision(s) are noted by the bold, double bars in left-hand margin throughout this document.

Legend

N/A	Not available
W/W	Weight/Weight
OEL	Occupational Exposure Limit
STEL	Short Term Exposure Limit
TWA	Time Weighted Average
ACGIH	American Conference of Governmental Industrial Hygienists, Inc.
DOW IHG	Dow Industrial Hygiene Guideline
WEEL	Workplace Environmental Exposure Level
HAZ_DES	Hazard Designation
Action Level	A value set by OSHA that is lower than the PEL which will trigger the need for activities such as exposure monitoring and medical surveillance if exceeded.

Dow AgroSciences LLC urges each customer or recipient of this (M)SDS to study it carefully and consult appropriate expertise, as necessary or appropriate, to become aware of and understand the data contained in this (M)SDS and any hazards associated with the product. The information herein is provided in good faith and believed to be accurate as of the effective date shown above. However, no warranty, express or implied, is given. Regulatory requirements are subject to change and may differ between various locations. It is the buyer's/user's responsibility to ensure that his activities comply with all federal, state, provincial or local laws. The information presented here pertains only to the product as shipped. Since conditions for use of the product are not under the control of the manufacturer, it is the buyer's/user's duty to determine the conditions necessary for the safe use of this product. Due to the proliferation of sources for information such as manufacturer-specific (M)SDSs, we are not and cannot be responsible for (M)SDSs obtained from any source other than ourselves. If you have obtained an (M)SDS from another source or if you are not sure that the (M)SDS you have is current, please contact us for the most current version.

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

R.E.D. FACTS

Glyphosate

Pesticide Reregistration

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

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

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

Use Profile

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

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

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

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

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

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

Regulatory History

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

Human Health Assessment

Toxicity

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

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

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

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

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

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

Dietary Exposure

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

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

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

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

Occupational and Residential Exposure

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

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

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

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

Human Risk Assessment

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

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

Environmental Assessment

Environmental Fate

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

Ecological Effects

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

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

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

Ecological Effects Risk Assessment

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

Additional Data Required

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

Product Labeling Changes Required

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

- **Protection of Aquatic Organisms**

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

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

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

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

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

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

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

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

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

- **Personal Protective Equipment (PPE)**

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

- **Entry Restrictions**

Products Not Primarily Intended for Home Use:

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

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

Products Primarily Intended for Home Use:

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

Regulatory Conclusion

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

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

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

For More Information

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

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

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

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

Arsenal Powerline

Active Ingredient

Imazapyr

ARSENAL® POWERLine™ herbicide

SPECIMEN

For the control of undesirable vegetation in grass pasture, rangeland and industrial noncropland areas including railroad, utility plant sites, petroleum tank farms, pumping installations, storage areas; utility, pipeline, and highway rights-of-way; fence rows; nonirrigation ditchbanks; 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)*	26.7%
Other Ingredients:	73.3%
Total:	100.0%

* Equivalent to 21.8% 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. 241-431 **EPA Est. No.**

KEEP OUT OF REACH OF CHILDREN
CAUTION/PRECAUCIÓN

Si usted no entiende la etiqueta, busque a alguien para que se la explique a usted en detalle. (If you do not understand this label, find someone to explain it to you in detail.)

See inside for complete **First Aid**, **Precautionary Statements**, **Directions For Use**, **Conditions of Sale and Warranty**, and state-specific crop and/or use site restrictions.

In case of an emergency endangering life or property involving this product, call day or night 1-800-832-HELP (4357).

Net Contents:

BASF Corporation
26 Davis Drive
Research Triangle Park, NC 27709

BASF
The Chemical Company

FIRST AID	
If swallowed	• Call a poison control center or doctor immediately for treatment advice. • Have person sip a glass of water if able to swallow. • **DO NOT** induce vomiting unless told to by a poison control center or doctor. • **DO NOT** give anything to an unconscious person.
If in eyes	• Hold eyes open and rinse slowly and gently with water for 15 to 20 minutes. • Remove contact lenses, if present, after first 5 minutes; then continue rinsing eyes. • Call a poison control center or doctor for treatment advice.
If on skin	• Take off contaminated clothing. • Rinse skin immediately with plenty of water for 15 to 20 minutes. • 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.
HOTLINE 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 and Domestic Animals

CAUTION. Harmful if swallowed, causes moderate eye irritation. Avoid contact with eyes or clothing. Prolonged or frequently repeated skin contact may cause allergic reactions in some individuals.

Personal Protective Equipment (PPE)

Some materials that are chemical resistant to this product are barrier laminate, butyl rubber, or polyethylene. If you want more options, follow the instructions for **Category A** on an EPA chemical-resistance category selection chart.

Mixers, loaders, applicators, and other handlers must wear:

- Long-sleeved shirt and long pants
- Shoes plus socks
- Chemical-resistant gloves for all mixers and loaders, plus applicators using handheld equipment

Follow manufacturer's instructions for cleaning and maintaining PPE. If no such instructions for washables exist, use detergent and hot water. Keep and wash PPE separately from other laundry. Discard clothing and other absorbent materials that have been drenched or heavily contaminated with this product's concentrate. **DO NOT** reuse them.

Engineering Controls

Pilots must use an enclosed cockpit that meets the requirements listed in the Worker Protection Standard (WPS) for agricultural pesticides [40 CFR 170.240(d)(6)].

USER SAFETY RECOMMENDATIONS

Users should:

- Wash hands with plenty of soap and water before eating, drinking, chewing gum, using tobacco, or using the toilet.
- Remove clothing/PPE immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing.
- Remove PPE immediately after handling this product. Wash the outside of gloves before removing. As soon as possible, wash thoroughly and change into clean clothing.

Physical and Chemical Hazards

Spray solutions of **Arsenal® PowerLine™ 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 PowerLine** or spray solutions of **Arsenal PowerLine** in unlined steel (except stainless steel) containers or spray tanks.

Environmental Hazards

This product is toxic to plants. Drift and runoff may be hazardous to plants in water adjacent to treated areas. **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 washwater or rinsate. See **Directions For Use** for additional precautions and requirements.

Directions For Use

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

Arsenal® PowerLine™ herbicide must be used only in accordance with instructions 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:

- Protective eyewear
- Coveralls
- Shoes plus socks
- Chemical-resistant gloves made of any waterproof material.

NONAGRICULTURAL 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.

DO NOT enter or allow others to enter treated areas 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 must be disposed of of on-site or at an approved waste disposal facility.

(continued)

STORAGE AND DISPOSAL *(continued)*

Container Handling

Nonrefillable Container. DO NOT reuse or refill this container. Triple rinse or pressure rinse container (or equivalent) promptly after emptying; then offer for recycling, if available, or reconditioning, if appropriate, or puncture and dispose of in a sanitary landfill, or by incineration, or by other procedures approved by state and local authorities.

Triple rinse containers small enough to shake (capacity ≤ 5 gallons) as follows: Empty the remaining contents into application equipment or a mix tank and drain for 10 seconds after the flow begins to drip. Fill the container 1/4 full with water and recap. Shake for 10 seconds. Pour rinsate into application equipment or a mix tank, or store rinsate for later use or disposal. Drain for 10 seconds after the flow begins to drip. Repeat this procedure two more times.

Triple rinse containers too large to shake (capacity > 5 gallons) as follows: Empty the remaining contents into application equipment or a mix tank. Fill the container 1/4 full with water. Replace and tighten closures. Tip container on its side and roll it back and forth, ensuring at least one complete revolution, for 30 seconds. Stand the container on its end and tip it back and forth several times. Turn the container over onto its other end and tip it back and forth several times. Empty the rinsate into application equipment or a mix tank, or store rinsate for later use or disposal. Repeat this procedure two more times.

Pressure rinse as follows: Empty the remaining contents into application equipment or mix tank and continue to drain for 10 seconds after the flow begins to drip. Hold container upside down over application equipment or mix tank, or collect rinsate for later use or disposal. Insert pressure rinsing nozzle in the side of the container and rinse at about 40 PSI for at least 30 seconds. Drain for 10 seconds after the flow begins to drip.

Refillable Container. Refill this container with pesticide only. **DO NOT** reuse this container for any other purpose. Triple rinsing the container before final disposal is the responsibility of the person disposing of the container. Cleaning before refilling is the responsibility of the refiller.

Triple rinse as follows: To clean the container before final disposal, empty the remaining contents from this container into application equipment or mix tank. Fill the container about 10% full with water. Agitate vigorously or recirculate water with the pump for 2 minutes. Pour or pump rinsate into application equipment or rinsate collection system. Repeat this rinsing procedure two more times.

(continued)

STORAGE AND DISPOSAL *(continued)*

Container Handling *(continued)*

When this container is empty, replace the cap and seal all openings that have been opened during use; return the container to the point of purchase or to a designated location. This container must only be refilled with a pesticide product. 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, if available, or dispose of container in compliance with state and local regulations.

In Case of Spill

In case of large-scale spillage regarding this product, call:

- CHEMTREC 1-800-424-9300
- BASF Corporation 1-800-832-HELP (4357)

Steps to be taken in case material is released or spilled:

- Dike and contain the spill with inert material (sand, earth, etc.) and transfer liquid and solid diking material to separate containers for disposal.
- Remove contaminated clothing, and wash affected skin areas with soap and water.
- Wash clothing before reuse.
- Keep the spill out of all sewers and open bodies of water.

RESTRICTIONS

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® PowerLine™ herbicide** unless this risk is acceptable. **DO NOT** side trim desirable vegetation with this product unless severe injury or plant death can be tolerated. **DO NOT** allow sprays to drift onto desirable plants.

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

PRODUCT INFORMATION

Use Sites. Arsenal PowerLine is an aqueous solution to be mixed with water and a surfactant and applied as a spray solution to grass pasture and rangeland and industrial noncropland including utility plant sites, petroleum tank farms, pumping installations, storage areas; railroad, utility, and highway rights-of-way; fence rows; and nonirrigation ditchbanks including grazed or hayed areas within these sites. **Arsenal PowerLine** is recommended for the establishment and maintenance of wildlife openings. **Arsenal PowerLine** 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 PowerLine will control most annual and perennial grasses and broadleaf weeds in addition to many brush and vine species. **Arsenal PowerLine** will provide residual control of labeled weeds that 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 **ADJUVANTS** section for specific recommendations). These solutions may be applied selectively using low-volume techniques or may be applied broadcast by using ground equipment or aerial equipment. In addition, **Arsenal PowerLine** may also be used for stump and cut stem treatments (see specific directions).

Herbicidal Activity. Arsenal PowerLine 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 2 weeks after application. Complete kill of plants may not occur for several weeks. Applications of **Arsenal PowerLine** are rainfast 1 hour after treatment.

PRECAUTIONS FOR AVOIDING INJURY TO NONTARGET PLANTS

Untreated trees can occasionally be affected by root uptake of **Arsenal PowerLine** through movement into the top soil. Injury or loss of desirable trees or other plants may result if **Arsenal PowerLine** 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.

SPRAY DRIFT REQUIREMENTS

Aerial Applications

- Applicators are required to use a coarse or coarser droplet size (ASABE S572) or, if specifically using a spinning atomizer nozzle, applicators are required to use a volume mean diameter (VMD) of 385 microns or greater for release heights below 10 feet. Applicators are required to use a very coarse or coarser droplet size or, if specifically using a spinning atomizer nozzle, applicators are required to use a VMD of 475 microns or greater for release heights above 10 feet. Applicators must consider the effects of nozzle orientation and flight speed when determining droplet size.

- Applicators are required to use upwind swath displacement.
- The boom length must not exceed 60% of the wingspan or 90% of the rotor blade diameter to reduce spray drift.
- Applications with wind speeds less than 3 mph and with wind speeds greater than 10 mph are prohibited.
- Applications into temperature inversions are prohibited.

Ground Boom Applications

- Applicators are required to use a nozzle height below 4 feet above the ground or plant canopy and coarse or coarser droplet size (ASABE S572) or, if specifically using a spinning atomizer nozzle, applicators are required to use a volume mean diameter (VMD) of 385 microns or greater.
- Applications with wind speeds greater than 10 mph are prohibited.
- Applications into temperature inversions are prohibited.

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.

ADJUVANTS

Postemergence applications of Arsenal® PowerLine™ herbicide require the addition of a spray adjuvant for optimum herbicide performance.

Nonionic Surfactants. Use a nonionic surfactant (NIS) at the rate 0.25% volume/volume (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 an 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 (MSO) 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 PowerLine** 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.

APPLICATION METHODS

AERIAL APPLICATIONS

All precautions must be taken to minimize or eliminate spray drift. Fixed-wing aircraft and helicopters can be used to apply **Arsenal PowerLine**. 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. Side trimming is not recommended with **Arsenal PowerLine** unless death of treated tree can be tolerated.

Uniformly apply the specified amount of **Arsenal PowerLine** in 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. Include in the spray solution a nonionic surfactant or methylated seed oil or manufacturer's label rate of a silicone-based surfactant (see the **ADJUVANTS** 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

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. 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 indicator, 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® PowerLine™ herbicide** per acre in combination with recommended tank mixes. Use rates higher than 3 pints per acre in these situations may cause injury or death of desirable trees when their roots extend into treated zones.

FOLIAR

Side Trimming
DO NOT side trim with **Arsenal PowerLine** unless severe injury or death of the treated tree can be tolerated. **Arsenal PowerLine** is readily translocated and can result in death of the entire tree.

Low-volume Foliar
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 PowerLine** plus surfactant (see the **ADJUVANTS** 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 PowerLine** per acre. Excessive wetting of foliage is not recommended. See the following mixing guide for some suggested volumes of **Arsenal PowerLine** and water.

BRUSH CONTROL

Use the specified rate of **Arsenal PowerLine** with the preferred application technique for the control of undesirable brush.

TANK MIXES AND APPLICATION RATES*

Target Vegetation	Rate of Arsenal® PowerLine™ herbicide	Tank Mix
Mixed hardwoods without elm, locust, or pine	1.0 to 1.5% by volume	Surfactant
Mixed hardwoods containing elm, locust, and pine	0.5 to 1.0% by volume	**Accord®** at 2 to 3% by volume plus surfactant
Mixed hardwoods with locust and pine, but no elm	0.5 to 1.0% by volume	**Krenite®** at 2 to 5% by volume plus surfactant
Mixed hardwoods with locust and elm, but no pine	0.5 to 1.0% by volume	**Escort®** at 2 ozs/acre or 2.3 grams/gallon plus surfactant

* Tank mixes with 2,4-D or products containing 2,4-D have resulted in reduced efficacy of **Arsenal PowerLine**.

MIXING CHART

% Solution	Arsenal PowerLine per Gallon of Mix (fl ozs)	Arsenal PowerLine per 4-gallon Backpack (fl ozs)
0.5%	0.6	2.6
1.0%	1.3	5.1
2.0%	2.6	10.2
3.0%	3.8	15.4
5.0%	6.4	25.6

MEASURING CHART		
128 fluid ounces	=	1 gallon
16 fluid ounces	=	1 pint
8 pints	=	1 gallon
4 quarts	=	1 gallon
2 pints	=	1 quart

Application Instructions. For low volume, select proper nozzles so that herbicide is not overapplied. Best results are achieved when the spray covers the crown and approximately 70% 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-feet to 8-feet tall, swipe the sides of target vegetation by directing spray to at least 2 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 2 sides of the target in smooth zigzag motions from crown to bottom.

Low Volume with Hydraulic Handgun Application Equipment. Use same technique as described 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 that 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 Prepared (gallons)	**Desired Concentration** (fluid volume)				
	0.5%	**0.75%**	**1%**	**1.5%**	**5%**
	(amount of Arsenal® PowerLine™ herbicide to use)				
1	0.6 fl oz	0.9 fl oz	1.3 fl ozs	1.9 fl ozs	6.5 fl ozs
3	1.9 fl ozs	2.8 fl ozs	3.8 fl ozs	5.8 fl ozs	1.2 pints
4	2.5 fl ozs	3.8 fl ozs	5.1 fl ozs	7.7 fl ozs	1.6 pints
5	3.2 fl ozs	4.8 fl ozs	6.5 fl ozs	9.6 fl ozs	2 pints
50	2 pints	3 pints	4 pints	6 pints	10 quarts
100	4 pints	6 pints	8 pints	6 quarts	5 gallons
2 tablespoons = 1 fluid ounce					

High-volume Foliar
For optimum performance when spraying medium-density 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 runoff causing increased ground cover injury and injury to desirable species.

To prepare the spray solution, thoroughly mix **Arsenal PowerLine** at a rate of 2 to 6 pints per acre (see **GROUND APPLICATIONS** section) in water and add a surfactant (see **ADJUVANTS** 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 PowerLine** per acre. Uniformly cover the foliage of the vegetation to be controlled, but **DO NOT** apply to runoff. Excessive wetting of foliage is not recommended.

Tank Mixes for Brush Control
Arsenal PowerLine may be tank mixed with **Accord®**, **Banvel®**, **Escort®**, **Garlon® 3A**, **Krenite®**, **Roundup®**, **Telar®**, **Tordon® K**, and **Vanquish®** to provide control of **Arsenal PowerLine**-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, has resulted in reduced performance of **Arsenal PowerLine**.

Invert Emulsions. Arsenal PowerLine 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 runoff 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 SURFACE

Cut Stubble

Arsenal® PowerLine™ herbicide 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 PowerLine** at the rate of 1 to 2 pints per acre to the cut area. **Arsenal PowerLine** may be tank mixed with **Tordon® K** or picloram 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 PowerLine** 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 **APPLICATION METHODS** section of this label.

Stump and Cut-stem Treatments

Arsenal PowerLine may be used to control undesirable woody vegetation on noncropland by applying the **Arsenal PowerLine** 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 runoff or puddling.

Mixing. Arsenal PowerLine 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 PowerLine** with 1 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 PowerLine** 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. Ensure 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 1-inch intervals between cut edges. Ensure 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 2-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 millliliter of solution at each injection site. Make at least 1 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 1 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 1 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 PowerLine can be used under asphalt, pond liners and other paved areas ONLY in industrial sites or where the pavement has a suitable barrier along the perimeter that prevents encroachment of roots of desirable plants.

Arsenal PowerLine 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 PowerLine** applications as soon as possible. **DO NOT** apply where the chemical may contact the roots of desirable trees or other plants.

The product may not be used under pavement on residential properties such as driveways or parking lots, nor 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 drip line.

APPLICATION DIRECTIONS FOR USE UNDER PAVED SURFACES

Applications should be made to the soil surface only when final grade is established. **DO NOT** move soil following **Arsenal® PowerLine™ herbicide** application.

Apply **Arsenal PowerLine** in sufficient water (at least 100 gallons per acre) to ensure thorough and uniform wetting of the soil surface, including the shoulder areas. Add **Arsenal PowerLine** at a rate of 6 pints per acre (2.2 fl ozs 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 PowerLine** is needed for herbicide activation. **Arsenal PowerLine** 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 PowerLine may be used on unimproved Bermudagrass and Bahiagrass turf on roadsides, utility rights-of-way and other noncropland industrial sites. The application of **Arsenal PowerLine** 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 PowerLine** 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 fl 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 PowerLine** at 6 fl ozs to 12 fl ozs per acre when the Bermudagrass is dormant. Apply **Arsenal PowerLine** at 6 fl ozs to 8 fl ozs per acre after the Bermudagrass has reached full greenup. Applications made during greenup will delay greenup. Include a surfactant in the spray solution (see preceding **IMPORTANT** statements).

For additional preemergence control of annual grasses and small-seeded broadleaf weeds, add **Pendulum® AquaCap™ herbicide** at the rate of 2.1 to 4.2 quarts 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 PowerLine** at 8 fl ozs per acre plus **Roundup® herbicide** at 12 fl ozs 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 to 2 pints per acre. Observe all precautions and restrictions on the **Garlon 3A** and **Roundup** labels.

BAHIAGRASS
Apply **Arsenal PowerLine** at 4 fl ozs to 8 fl ozs per acre when the Bahiagrass is dormant or after the grass has initiated greenup but has not exceeded 25% greenup. Include in the spray solution a surfactant (see **ADJUVANTS** section for specific recommendations on surfactants).

Weeds Controlled in Unimproved Bermudagrass and Bahiagrass

Bedstraw*	*Gallium* 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*
White clover	*Trifolium repens*
Wild carrot	*Daucus carota*
Yellow woodsorrel	*Oxalis stricta*

* Use not permitted in California unless otherwise directed by supplemental labeling.

GRASS GROWTH AND SEEDHEAD SUPPRESSION

Arsenal PowerLine may be used to suppress growth and seedhead development of certain turfgrass in unimproved areas. When applied to desirable turf, **Arsenal PowerLine** 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 3 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 PowerLine** at 6 fl ozs to 8 fl ozs per acre from early greenup to prior to seedhead initiation. **DO NOT** add a surfactant for this application.

COOL SEASON UNIMPROVED TURF
Apply **Arsenal PowerLine** at 2 fl ozs per acre plus 0.25% nonionic surfactant. For increased suppression, **Arsenal PowerLine** may be tank mixed with such products as **Campaign®** (24 ozs per acre) or **Embark®** (8 ozs 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® PowerLine™ herbicide**.

TOTAL VEGETATION CONTROL WHERE BARE GROUND IS DESIRED

Arsenal PowerLine is an effective herbicide for preemergence or postemergence control of many annual and perennial broadleaf and grass weeds where bare ground is desired. **Arsenal PowerLine** is particularly effective on hard-to-control perennial grasses. **Arsenal PowerLine** at 1.5 pints to 6 pints per acre can be used alone or in tank mix with herbicides such as **Banvel®**, **Finale®**, **Karmex®**, **Oust®**, **Pendulum®**, **Roundup®**, simazine, or **Vanquish®**. The degree and duration of control are dependent on the rate of **Arsenal PowerLine** used, tank mix partner, the volume of carrier, soil texture, rainfall and other conditions.

Consult manufacturers labels for specific rates and weeds controlled. Always follow the more restrictive label when making an application involving tank mixes.

TANK MIX INSTRUCTIONS FOR BARE GROUND

Herbicide Rates per Acre*

Arsenal PowerLine	**Pendulum® AquaCap™ herbicide**	**Pendulum® 3.3 EC herbicide**	Diuron
(pints)	(quarts)	(quarts)	(lbs ai)
1.5 to 3	4.2	4.8	4 to 6
2 to 4	4.2	4.8	6 to 10
3 to 6	4.2	4.8	8 to 12

* Use higher rates for fall applications and in areas that have not been previously treated or that feature heavy infestations.

Applications of **Arsenal PowerLine** may be made at any time 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 **ADJUVANTS** 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 PowerLine** may be tank mixed with products such as **Finale** or **Roundup**. Tank mixes with 2,4-D or products containing 2,4-D have reduced performance of **Arsenal PowerLine**. Always follow the more restrictive label when tank mixing.

SPOT TREATMENTS

Arsenal PowerLine 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 PowerLine** plus an adjuvant. For increased burndown, include **Finale** or **Roundup**, 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 PowerLine** may be applied as a spot treatment at a rate of 2 fl ozs to 48 fl ozs 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 1/10 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 fl ozs per acre per year.

GRAZING AND HAYING RESTRICTIONS

There are no grazing restrictions following **Arsenal PowerLine** application. **DO NOT** cut forage grass for hay for 7 days after **Arsenal PowerLine** application.

INSTRUCTIONS FOR RANGELAND USE

Arsenal PowerLine may be applied to rangeland for the control of undesirable vegetation to achieve 1 or more of the following vegetation management objectives:

1. To control undesirable (nonnative, invasive and noxious) plant species
2. To control undesirable vegetation to aid in the establishment of desirable rangeland plant species
3. To control undesirable vegetation to aid in the establishment of desirable rangeland vegetation following a fire
4. To control undesirable vegetation to reduce wildfire fuel
5. To release existing desirable rangeland plant communities from the competitive pressure of undesirable plant species
6. To control undesirable vegetation to improve wildlife habitat

To ensure the protection of threatened and endangered plants when applying **Arsenal PowerLine** 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.

See the appropriate section(s) of this label for specific use directions for the desired rangeland vegetation management objective.

Arsenal PowerLine 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 INSTRUCTIONS

Rotational crops may be planted 12 months after applying **Arsenal® PowerLine™ herbicide** at the specified pasture and rangeland rate. Following 12 months after an **Arsenal PowerLine** 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 PowerLine** 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

Arsenal PowerLine 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 PowerLine**.

For established biennials and perennials, postemergence applications of Arsenal PowerLine 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 Foliar** section of **GROUND APPLICATIONS**); low-volume applications may provide control of the target species with less **Arsenal PowerLine** per acre than is shown for the broadcast treatments. **Arsenal PowerLine** may be used only in accordance with the instructions on this 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 PowerLine** should be tank mixed or applied sequentially with an appropriate registered herbicide having a different mode of action to ensure control.

Weeds Controlled

GRASSES

Common Name	Species	Growth Habit[2]
	Apply 2 to 3 pints per acre[1]	
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	(*Sporobolus cryptandrus*)	A
Smooth brome	(*Bromus inermis*)	P
Vaseygrass	(*Paspalum urvillei*)	P
Wild oats	(*Avena fatua*)	A
Witchgrass	(*Panicum capillare*)	A
	Apply 3 to 4 pints per acre[1]	
Barnyardgrass[3]	(*Echinochloa crus-galli*)	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*)	P
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

Weeds Controlled *(continued)*

GRASSES *(continued)*

Common Name	Species	Growth Habit[2]
	Apply 4 to 6 pints per acre[1]	
Bahiagrass	(*Paspalum notatum*)	P
Bermudagrass[4]	(*Cynodon dactylon)*	P
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 to 3 pints per acre[1]	
African rue[10]	(*Peganum harmala*)	P
Alligatorweed	(*Alternanthera philoxeroides*)	A/P
Burdock	(*Arctium* spp.)	B
Carolina geranium	(*Geranium carolinianum*)	A
Carpetweed	(*Mollugo verticillata*)	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

Weeds Controlled *(continued)*

BROADLEAF WEEDS *(continued)*

Common Name	Species	Growth Habit[2]
	Apply 2 to 3 pints per acre[1] *(continued)*	
Smartweed	(*Polygonum* spp.)	A
Sorrell	(*Rumex* spp.)	P
Sunflower	(*Helianthus* spp.)	A
Sweet clover	(*Melilotus* spp.)	A
Tansymustard	(*Ambrosia psilostachya*)	P
Wild carrot	(*Daucus carota*)	B
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 to 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 amplexicaule*)	A
Knotweed, prostrate[3]	(*Polygonum aviculare*)	A/P
Pokeweed	(*Phytolacca americana*)	P
Purple loosestrife[6]	(*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
Shepherdspurse[3]	(*Capsella bursa-pastoris*)	A
Spurge, annual[3]	(*Euphorbia* spp.)	A
Stinging nettle[6]	(*Urtica dioica*)	P
Velvetleaf[3]	(*Abutilon theophrasti*)	A
Yellow starthistle	(*Centaurea solstitialis*)	A

Weeds Controlled *(continued)*

BROADLEAF WEEDS *(continued)*

Common Name	Species	Growth Habit[2]
	Apply 4 to 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
Sago pondweed[10]	(*Potamogeton pectinatus*)	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 to 3 pints per acre[1]	
Wild buckwheat	(*Polygonum convolvulus*)	P
	Apply 3 to 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 bracteata*)	P
	Apply 4 to 6 pints per acre[1]	
Kudzu[4]	(*Pueraria lobata*)	P
Trumpetcreeper	(*Campsis radicans*)	P
Virginia creeper	(*Parthenocissus quinquefolia*)	P
Wild grape	(*Vitis* spp.)	P

Weeds Controlled *(continued)*

BRUSH SPECIES

Apply 4 to 6 pints per acre[1]

Common Name	Species	Growth Habit[2]
American beech	(*Fagus grandifolia*)	P
Ash	(*Fraxinus* spp.)	P
Bald cypress	(*Taxodium distichum*)	P
Bigleaf maple	(*Acer macrophyllum*)	P
Blackgum	(*Nyssa sylvatica*)	P
Black locust[7]	(*Robinia pseudoacacia*)	P
Boxelder	(*Acer negundo*)	P
Brazilian peppertree	(*Schinus terebinthifolius*)	P
Cherry	(*Prunus* spp.)	P
Chinaberry	(*Melia azedarach*)	P
Chinese tallow-tree	(*Sapium sebiferum*)	P
Dogwood	(*Cornus* spp.)	P
Elm[8]	(*Ulmus* spp.)	P
Hawthorn	(*Crataegus* spp.)	P
Hickory	(*Carya* spp.)	P
Honeylocust[9]	(*Gleditsia triacanthos*)	P
Maple	(*Acer* spp.)	P
Melaleuca	(*Melaleuca quinquenervia*)	P
Mulberry	(*Morus* spp.)	P
Oak	(*Quercus* spp.)	P
Persimmon	(*Diospyros virginiana*)	P
Poplar	(*Populus* spp.)	P
Privet	(*Ligustrum vulgare*)	P
Red alder	(*Alnus rubra*)	P
Red maple	(*Acer rubrum*)	P
Russian olive	(*Elaeagnus 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® herbicide**.
[4] Use a minimum of 75 GPA; control of established stands may require repeat applications.
[5] For preemergence control, tank mix with **Karmex®**, **Pendulum**, or diuron.
[6] For best results, early postemergence applications are required.
[7] Tank mix with **Accord®**, **Escort®**, **Garlon® 3A**, **Krenite®**, **Roundup®**, or **Tordon® K**.
[8] Tank mix with **Accord**, **Escort**, or **Roundup**.
[9] Tank mix with **Accord**, **Garlon 3A**, **Roundup**, or **Tordon K**.
[10] Use not permitted in California unless otherwise directed by supplemental labeling.

Conditions of Sale and Warranty

The **Directions For Use** of this product reflect the opinion of experts based on field use and tests. The directions are believed to be reliable and must be followed carefully. However, it is impossible to eliminate all risks inherently associated with the use of this product. Crop injury, ineffectiveness or other unintended consequences may result because of such factors as weather conditions, presence of other materials, or use of the product in a manner inconsistent with its labeling, all of which are beyond the control of BASF CORPORATION ("BASF") or the Seller. To the extent consistent with applicable law, all such risks shall be assumed by the Buyer.

BASF warrants that this product conforms to the chemical description on the label and is reasonably fit for the purposes referred to in the **Directions For Use**, subject to the inherent risks, referred to above.

TO THE EXTENT CONSISTENT WITH APPLICABLE LAW, BASF MAKES NO OTHER EXPRESS OR IMPLIED WARRANTY OF FITNESS OR MERCHANTABILITY OR ANY OTHER EXPRESS OR IMPLIED WARRANTY.

TO THE EXTENT CONSISTENT WITH APPLICABLE LAW, BUYER'S EXCLUSIVE REMEDY AND BASF'S EXCLUSIVE LIABILITY, WHETHER IN CONTRACT, TORT, NEGLIGENCE, STRICT LIABILITY, OR OTHERWISE, SHALL BE LIMITED TO REPAYMENT OF THE PURCHASE PRICE OF THE PRODUCT.

TO THE EXTENT CONSISTENT WITH APPLICABLE LAW, BASF AND THE SELLER DISCLAIM ANY LIABILITY FOR CONSEQUENTIAL, EXEMPLARY, SPECIAL OR INDIRECT DAMAGES RESULTING FROM THE USE OR HANDLING OF THIS PRODUCT.

BASF and the Seller offer this product, and the Buyer and User accept it, subject to the foregoing **Conditions of Sale and Warranty** which may be varied only by agreement in writing signed by a duly authorized representative of BASF. 1108

000241-00431.20111103.**NVA 2011-04-295-0216**
Based on: NVA 2011-04-295-0208
Supersedes: NVA 2011-04-295-0029

BASF Corporation
26 Davis Drive
Research Triangle Park, NC 27709

BASF

The Chemical Company

Safety Data Sheet
ARSENAL POWERLINE HERBICIDE

1. Product and Company Identification

Company
BASF CORPORATION
100 Park Avenue
Florham Park, NJ 07932, USA

24 Hour Emergency Response Information
CHEMTREC: 1-800-424-9300
BASF HOTLINE: 1-800-832-HELP (4357)

Substance number:	000000234359
Molecular formula:	C(13) H(15) N(3) O(3). C(3) H(9) N
Chemical family:	imidazole derivative
Synonyms:	Isopropylamine salt of imazapyr

2. Hazards Identification

Emergency overview

CAUTION:
May cause moderate but temporary irritation to the eyes.
Prolonged or repeated skin contact may cause sensitization or allergic reactions.
HARMFUL IF SWALLOWED.
KEEP OUT OF REACH OF CHILDREN.
KEEP OUT OF REACH OF DOMESTIC ANIMALS.
Avoid contact with the skin, eyes and clothing.
Avoid inhalation of mists/vapours.

See Product Label for additional precautionary statements.

State of matter: liquid
Colour: transparent
Colour: light yellow
Odour: odourless

Potential health effects

Primary routes of exposure:
Routes of entry for solids and liquids include eye and skin contact, ingestion and inhalation. Routes of entry for gases include inhalation and eye contact. Skin contact may be a route of entry for liquified gases.

Acute toxicity:
Slightly toxic after single ingestion. Relatively nontoxic after short-term skin contact. Relatively nontoxic after short-term inhalation.

Irritation / corrosion:
May cause slight but temporary irritation to the eyes. May cause slight irritation to the skin.

Sensitization:
Caused skin sensitization in animal studies.

Chronic toxicity:

Repeated dose toxicity: The product has not been tested. The statement has been derived from the properties of the individual components. No substance-specific organtoxicity was observed after repeated administration to animals.

Medical conditions aggravated by overexposure:
Individuals with pre-existing diseases of the respiratory system, skin or eyes may have increased susceptibility to excessive exposures.

Potential environmental effects

Aquatic toxicity:
There is a high probability that the product is not acutely harmful to fish. There is a high probability that the product is not acutely harmful to aquatic invertebrates. Acutely harmful for aquatic plants.

Terrestrial toxicity:
With high probability not acutely harmful to terrestrial organisms.

3. Composition / Information on Ingredients

CAS Number	Content (W/W)	Chemical name
81510-83-0	26.7 %	imazapyr isopropylamine salt
	73.3 %	Proprietary ingredients

4. First-Aid Measures

General advice:
First aid providers should wear personal protective equipment to prevent exposure. Remove contaminated clothing. Move person to fresh air. If person is not breathing, call 911 or ambulance, then give artificial respiration, preferably mouth-to-mouth if possible. Call a poison control center or physician for treatment advice. Have the product container or label with you when calling a poison control center or doctor or going for treatment.

If inhaled:
Remove the affected individual into fresh air and keep the person calm.

If on skin:
Rinse skin immediately with plenty of water for 15 - 20 minutes.

If in eyes:
Hold eyes open and rinse slowly and gently with water for 15 to 20 minutes. Remove contact lenses, if present, after first 5 minutes, then continue rinsing.

If swallowed:
Have person sip a glass of water if able to swallow. Do not induce vomiting unless told to by a poison control center or doctor. Never induce vomiting or give anything by mouth if the victim is unconscious or having convulsions.

Note to physician

Antidote:	No known specific antidote.
Treatment:	Treat symptomatically.

5. Fire-Fighting Measures

Flash point:		A flash point determination is unnecessary due to the high water content.
Autoignition:		Based on the water content the product does not ignite.
Lower explosion limit:		As a result of our experience with this product and our knowledge of its composition we do not expect any hazard as long as the product is used appropriately and in accordance with the intended use.
Upper explosion limit:		As a result of our experience with this product and our knowledge of its composition we do not expect any hazard as long as the product is used appropriately and in accordance with the intended use.
Flammability:	not highly flammable	

Suitable extinguishing media:
foam, dry powder, carbon dioxide, water spray

Hazards during fire-fighting:
carbon monoxide, carbon dioxide, nitrogen oxide, nitrogen dioxide, Hydrocarbons,
If product is heated above decomposition temperature, toxic vapours will be released. The substances/groups of substances mentioned can be released if the product is involved in a fire.

Protective equipment for fire-fighting:
Firefighters should be equipped with self-contained breathing apparatus and turn-out gear.

Further information:
In case of fire and/or explosion do not breathe fumes. Keep containers cool by spraying with water if exposed to fire. Collect contaminated extinguishing water separately, do not allow to reach sewage or effluent systems. Dispose of fire debris and contaminated extinguishing water in accordance with official regulations.

6. Accidental release measures

Personal precautions:
Take appropriate protective measures. Clear area. Shut off source of leak only under safe conditions. Extinguish sources of ignition nearby and downwind. Ensure adequate ventilation. Wear suitable personal protective clothing and equipment.

Environmental precautions:
Do not discharge into the subsoil/soil. Do not discharge into drains/surface waters/groundwater. Contain contaminated water/firefighting water.

Cleanup:
Dike spillage. Pick up with suitable absorbent material. Place into suitable containers for reuse or disposal in a licensed facility. Spilled substance/product should be recovered and applied according to label rates whenever possible. If application of spilled substance/product is not possible, then spills should be contained, solidified, and placed in suitable containers for disposal. After decontamination, spill area can be washed with water. Collect wash water for approved disposal.

7. Handling and Storage

Handling

General advice:
RECOMMENDATIONS ARE FOR MANUFACTURING, COMMERCIAL BLENDING, AND PACKAGING WORKERS. PESTICIDE APPLICATORS & WORKERS must refer to the Product Label and Directions for Use

attached to the product for Agricultural Use Requirements in accordance with the EPA Worker Protection Standard 40 CFR part 170. Ensure adequate ventilation. Provide good ventilation of working area (local exhaust ventilation if necessary). Keep away from sources of ignition - No smoking. Keep container tightly sealed. Protect contents from the effects of light. Protect against heat. Protect from air. Handle and open container with care. Do not open until ready to use. Once container is opened, content should be used as soon as possible. Avoid aerosol formation. Avoid dust formation. Provide means for controlling leaks and spills. Do not return residues to the storage containers. Follow label warnings even after container is emptied. The substance/ product may be handled only by appropriately trained personnel. Avoid all direct contact with the substance/product. Avoid contact with the skin, eyes and clothing. Avoid inhalation of dusts/mists/vapours. Wear suitable personal protective clothing and equipment.

Protection against fire and explosion:
The relevant fire protection measures should be noted. Fire extinguishers should be kept handy. Avoid all sources of ignition: heat, sparks, open flame. Sources of ignition should be kept well clear. Avoid extreme heat. Keep away from oxidizable substances. Electrical equipment should conform to national electric code. Ground all transfer equipment properly to prevent electrostatic discharge. Electrostatic discharge may cause ignition.

Storage

General advice:
Keep only in the original container in a cool, dry, well-ventilated place away from ignition sources, heat or flame. Protect containers from physical damage. Protect against contamination. The authority permits and storage regulations must be observed.

Storage incompatibility:
General advice: Segregate from incompatible substances. Segregate from foods and animal feeds. Segregate from textiles and similar materials.

8. Exposure Controls and Personal Protection

Users of a pesticidal product should refer to the product label for personal protective equipment requirements.

Advice on system design:
Whenever possible, engineering controls should be used to minimize the need for personal protective equipment.

Personal protective equipment

RECOMMENDATIONS FOR MANUFACTURING, COMMERCIAL BLENDING, AND PACKAGING WORKERS:

Respiratory protection:
Wear respiratory protection if ventilation is inadequate. Wear a NIOSH-certified (or equivalent) TC23C Chemical/Mechanical type filter system to remove a combination of particles, gas and vapours. For situations where the airborne concentrations may exceed the level for which an air purifying respirator is effective, or where the levels are unknown or Immediately Dangerous to Life or Health (IDLH), use NIOSH-certified full facepiece pressure demand self-contained breathing apparatus (SCBA) or a full facepiece pressure demand supplied-air respirator (SAR) with escape provisions.

Hand protection:
Chemical resistant protective gloves, Protective glove selection must be based on the user's assessment of the workplace hazards.

Eye protection:
Safety glasses with side-shields. Tightly fitting safety goggles (chemical goggles). Wear face shield if splashing hazard exists.

Body protection:
Body protection must be chosen depending on activity and possible exposure, e.g. head protection, apron, protective boots, chemical-protection suit.

General safety and hygiene measures:
Wear long sleeved work shirt and long work pants in addition to other stated personal protective equipment. Work place should be equipped with a shower and an eye wash. Handle in accordance with good industrial hygiene and safety practice. Personal protective equipment should be decontaminated prior to reuse. Gloves must be inspected regularly and prior to each use. Replace if necessary (e.g. pinhole leaks). Take off immediately all contaminated clothing. Store work clothing separately. Hands and/or face should be washed before breaks and at the end of the shift. No eating, drinking, smoking or tobacco use at the place of work. Keep away from food, drink and animal feeding stuffs.

9. Physical and Chemical Properties

Form:	liquid	
Odour:	odourless	
Colour:	transparent light yellow	
pH value:	approx. 6 - 8	(25 °C)
Freezing point:	approx. 0 °C	(1,013.3 hPa) Information applies to the solvent.
Boiling point:	approx. 100 °C	(1,013.3 hPa) Information applies to the solvent.
Vapour pressure:	approx. 23.3 hPa	(20 °C) Information applies to the solvent.
Density:	approx. 1.10 g/cm3	(20 °C)
Relative density:	1.10	(20 °C)
Vapour density:		not determined
Partitioning coefficient n-octanol/water (log Pow):		not applicable
Viscosity, dynamic:	163.2 mPa.s	(20 °C)
Solubility in water:		miscible
Molar mass:	320.4 g/mol	

10. Stability and Reactivity

Conditions to avoid:
Avoid all sources of ignition: heat, sparks, open flame. Avoid prolonged storage. Avoid electro-static discharge. Avoid contamination. Avoid prolonged exposure to extreme heat. Avoid extreme temperatures.

Substances to avoid:
oxidizing agents, reducing agents

Hazardous reactions:
The product is chemically stable.

Decomposition products:
No hazardous decomposition products if stored and handled as prescribed/indicated., Prolonged thermal loading can result in products of degradation being given off.

Thermal decomposition:
Possible thermal decomposition products:
carbon monoxide, carbon dioxide, nitrogen oxide, nitrogen dioxide, Hydrocarbons
Stable at ambient temperature. If product is heated above decomposition temperature toxic vapours may be released.

Corrosion to metals:
Corrosive effect on: mild steel brass

Oxidizing properties:
Not an oxidizer.

11. Toxicological information

Acute toxicity

Oral:
Type of value: LD50
Species: rat
Value: > 2,000 mg/kg (OECD Guideline 423)

Inhalation:
Type of value: LC50
Species: rat
Value: > 5.5 mg/l
Exposure time: 4 h
The product has not been tested. The statement has been derived from substances/products of a similar structure or composition.

Dermal:
Type of value: LD50
Species: rabbit
Value: > 5,000 mg/kg (OECD Guideline 402)

Irritation / corrosion

Skin:
Species: rabbit
Result: non-irritant
Method: Primary skin irritation test

Eye:
Species: rabbit
Result: non-irritant

Sensitization:
Skin sensitization test
Species: guinea pig
Result: Caused skin sensitization in animal studies.

Genetic toxicity

Information on: Imazapyr
No mutagenic effect was found in various tests with microorganisms and mammalian cell culture. The substance was not mutagenic in a test with mammals.

Carcinogenicity

Information on: Imazapyr
In long-term studies in rats and mice in which the substance was given by feed, a carcinogenic effect was not observed.

Reproductive toxicity

Information on: Imazapyr
The results of animal studies gave no indication of a fertility impairing effect.

Development:

Information on: Imazapyr

No indications of a developmental toxic / teratogenic effect were seen in animal studies.
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12. Ecological Information

Fish

Acute:
Cyprinus carpio/LC50 (96 h): > 120 mg/l

Aquatic invertebrates

Acute:
Daphnia magna/EC50 (48 h): > 100 mg/l

Aquatic plants

Toxicity to aquatic plants:
green algae/EC50 (72 h): > 98 mg/l

Non-Mammals

Information on: imazapyr
Other terrestrial non-mammals:
mallard duck/LC50: > 5,000 ppm
With high probability not acutely harmful to terrestrial organisms.
Honey bee/LD50: > 100 ug/bee
With high probability not acutely harmful to terrestrial organisms.

Environmental mobility:

Information on: Imazapyr
Assessment transport between environmental compartments:
The substance will not evaporate into the atmosphere from the water surface.
Following exposure to soil, the product trickles away and can - dependant on degradation - be transported to deeper soil areas with larger water loads.

Other adverse effects:

The ecological data given are those of the active ingredient. Do not release untreated into natural waters.

13. Disposal considerations

Waste disposal of substance:
Pesticide wastes are regulated. Improper disposal of excess pesticide, spray mix or rinsate is a violation of federal law. If pesticide wastes cannot be disposed of according to label instructions, contact the State Pesticide or Environmental Control Agency or the Hazardous Waste representative at the nearest EPA Regional Office for guidance.

Container disposal:
Rinse thoroughly at least three times (triple rinse) in accordance with EPA recommendations. Consult state or local disposal authorities for approved alternative procedures such as container recycling. Recommend crushing, puncturing or other means to prevent unauthorized use of used containers.

RCRA:
This product is not regulated by RCRA.

14. Transport Information

Land transport
USDOT

Not classified as a dangerous good under transport regulations

Sea transport
IMDG

Not classified as a dangerous good under transport regulations

Air transport
IATA/ICAO

Not classified as a dangerous good under transport regulations

15. Regulatory Information

Federal Regulations

Registration status:

Crop Protection	TSCA, US	released / exempt
Chemical	TSCA, US	blocked / not listed

OSHA hazard category: Chronic target organ effects reported; ACGIH TLV established

EPCRA 311/312 (Hazard categories): Acute; Chronic

State regulations

CA Prop. 65:
THIS PRODUCT CONTAINS A CHEMICAL(S) KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER AND BIRTH DEFECTS OR OTHER REPRODUCTIVE HARM.

16. Other Information

Refer to product label for EPA registration number.

Recommended use: herbicide

NFPA Hazard codes:
Health : 2 Fire: 1 Reactivity: 0 Special:

We support worldwide Responsible Care® initiatives. We value the health and safety of our employees, customers, suppliers and neighbors, and the protection of the environment. Our commitment to Responsible Care is integral to conducting our business and operating our facilities in a safe and environmentally responsible fashion, supporting our customers and suppliers in ensuring the safe and environmentally sound handling of our

products, and minimizing the impact of our operations on society and the environment during production, storage, transport, use and disposal of our products.

SDS Prepared by:
BASF NA Product Regulations
msds@basf.com

SDS Prepared on: 2013/08/01

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

IMAZAPYR

In addition to the review that is presented below, a comprehensive review available from USDA Forest Service provides information that incorporates more recent studies and data. The US Forest Service risk assessment report is available at: http://www.fs.fed.us/foresthealth/pesticide/risk.shtml

Review conducted by MDAR and MassDEP for use in Sensitive Areas of Rights-of-Way in Massachusetts

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 derrnal 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.

REFERENCES

2. Farm Chemicals Handbook: 1985 Dictionary, buyer's guide to trade names and equipment. Pub. by Meister Pub. Co.

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103. Acute Toxicology of AC 243,997 to Rats and Rabbits. American Cyanamid Company, A83-24.

104. Acute Toxicology of AC 252,925 22.6% to Rats and Rabbits. American Cyanamid Company, A83-67.

105. Acute Inhalation Toxicity of AC 243,997 in Sprague-Dawley Rats. Food and Drug Research Laboratories, Inc. Study No. 7624.

106. Acute Inhalation Toxicity of AC 252,925 in Sprague-Dawley Rats. Food and Drug Research Laboratories, Inc. Study No. 7607.

107. Evaluation of the Sensitization Potential of AC 243,997 in Guinea Pigs. Toxicology Pathology Services, Inc. Study No. 186A—201-231-83.

108. Evaluation of the Sensitization Potential of AC 252,925 in Guinea Pigs. Toxicology Pathology Services, Inc. Study No. 186A—201-231-83.

109. Twenty-one Day Dermal Toxicity Study with AC 243,997 in Rabbits. Toxicology Pathology Services, Inc. Study No. 186B—301-230-83.

110. Twenty—one Day Dermal Toxicity Study with AC 252,925 in Rabbits. Toxicology Pathology Services, Inc. Study No. 187B-230-83.

111. Teratology Study in Albino Rats with AC 243,997. ToxiGenics Study No. 450-1222.

112. Teratology Study in Albino Rabbits with Ac 243,997. ToxiGenics Study No. 450-1224.

113. Bacterial/Microsome Reverse Mutation (Ames) Test on CL 243,997. American Cyanamid Company GTOX Volume 3, Number 13.

114. Herbicide AC 243,997: The Absorption, Excretion, Tissue Residues and Metabolism of Carboxyl Carbon—14 Labeled AC 243,997 Nicotinic acid, 2-(4—isopropyl—4-methyl—5—oxo—2-imidzolin—2-yl) in the Rat. American C~anamid Company Report No. PD-M Volume 20—3.

Agricultural Chemistry Research and Extension
Department of Environmental and Molecular Toxicology
Oregon State University

National Institute of Environmental Health Services
Environmental Health Sciences Center
Community Outreach Program
Oregon State University

Imazapyr

Pesticide Fact Sheet: Forestry Use

Product Information

- Imazapyr is the common name for the active ingredient in the herbicide products **Arsenal** and **Chopper**.

- Imazapyr is a systemic plant growth inhibitor. This chemical is biologically active in plants at low concentrations. Imazapyr is rapidly taken up by the plant, where it inhibits an enzyme essential to plant growth. This enzyme is not present in other organisms.

- Arsenal is a formulated salt of imazapyr (53.1% active ingredient and 46.9% inert ingredients). It is used primarily to control woody plants in forestry. Chopper, also formulated as a salt (27.6% active ingredient, 72.4% inert ingredients), is another formulation of imazapyr.

- Arsenal and Chopper are typically applied at rates of 0.06 to 1.25 pounds of active ingredient per acre. The products can be applied to foliage, freshly cut stumps, injected into trees, or applied to cuts made around the base of a tree.

- Imazapyr may be applied all year, depending on the use. It is often applied aerially in the fall for site preparation and conifer release.

- For comparative purposes, the Environmental Protection Agency (EPA) categorizes pesticides by their short-term toxicity on a scale of I (most toxic) to IV (least toxic). Most undiluted imazapyr formulations are Toxicity Category IV.

Public Health

- Researchers use animal studies to define the potential for a pesticide to cause harmful effects to human health. It is important to know that these tests are carried out using doses high enough to cause toxicity (poisoning). Effects seen at toxic doses in animals are unlikely to occur after short-term, low-level exposure in humans. The level of exposure must be considered to estimate the risk of harmful effects.

- Based on laboratory studies, imazapyr is classified as practically non-toxic to mammals on a short term (acute) basis.

- Rats treated with an oral administration of imazapyr eliminated 87% of the material within 24 hours.

- There is no evidence that imazapyr causes cancer, DNA damage, nerve damage, or birth defects.

- The EPA has classified imazapyr as a Class E carcinogen (no evidence of carcinogenicity for humans).

Wildlife Effects

- Laboratory and field studies indicate that imazapyr is practically non-toxic to fish, birds, and bees on a short-term (acute) basis.

- Imazapyr is toxic to plants at very low concentrations. Applicators should take precautions to minimize drift to non-target areas.

- Imazapyr does not appear to bioaccumulate in animals.

Environmental Fate

- Imazapyr may be persistent in soils. Half-lives range from 14 days to 17 months.

- In forestry dissipation studies, reported values for the half-life of imazapyr range from 14 to 44 days in forest litter, 19 to 34 days in forest soils, and 12 to 40 days on plants.
- Imazapyr is water soluble and does not readily bind to organic

material in soils. Therefore, it is classified as highly mobile and can travel through soil with water and enter groundwater. It can also move with runoff and enter surface water. Its low application rates minimize potential impacts on surface or groundwater. Forestry uses should be evaluated for potential surface and groundwater contamination.

Risk Assessment

- The EPA has evaluated use practices, environmental fate, potential exposure routes, and toxicity of imazapyr and has set a Reference Dose (RfD) for imazapyr of 2.50 mg/kg/day. A 70 kg (154 lb) person would have an RfD of l75 mg/day. The RfD is the amount of daily pesticide exposure judged to pose no appreciable risk over a 70-year lifetime. Imazapyr's RfD is based on the results of the most sensitive animal studies (dog) and includes built-in safety measures.
- EPA has determined that the expected exposure associated with imazapyr in forestry use will not result in adverse health effects. However, you should take reasonable precautions to avoid exposure. Do not walk through freshly-sprayed vegetation. Do not eat berries, mushrooms, or other edibles, or drink the water from newly-treated areas. If you are concerned about exposure, consult the resources listed in Additional Information.

References

- American Cyanamid Company. 1988. Imazapyr Environmental Fate and Physical Properties Data Summary. American Cyanamid Company. Princeton, NJ.

- Bureau of Land Management. 1991. Vegetation Treatment on BLM Lands in Thirteen Western States, Final Environmental Impact Statement With Appendices. U.S. Department of the Interior. Washington, D.C.

- Meister, R.T., editor. 1996. Farm Chemicals Handbook '96. Meister Publishing Company. Willoughby, OH.

- U.S. Environmental Protection Agency. 1995. Pesticide Environmental Fate One-Line Summary: Imazapyr. Environmental Fate and Effects Division. Washington, D.C.

- Vogue, P.A., E.A. Kerle, and J.J. Jenkins. 1994. OSU Extension Pesticide Properties Database. Department of Agricultural Chemistry. Oregon State University. Corvallis, OR.

Additional Information:

Oregon

- Oregon State University Extension Environmental Chemistry and Toxicology Program
  1-541-737-5993 Extension Specialist

- Oregon Poison Control
  1-800-222-1222 (National)
  1-503-494-8968 (Portland)
  1-800-452-7165 (Outside Portland)

- Oregon Department of Agriculture
  1-503-986-4550
  1-503-986-4635 (Pesticide Division)

- Oregon Health Division Pesticide Analytical Response Center
  1-503-731-4025 (8 a.m.-5 p.m., M-F)

Washington

- Poison Control Center
  1-800-222-1222 (National)
  1-206-526-2121 (Seattle)
  1-800-732-6985 (Outside Seattle)

- Washington Dept. of Agriculture, Pesticide Management Division
  1-877-301-4555 (toll free)
  1-360-902-2040 (Olympia)
  1-509-576-3064 (Yakima)

- Washington State University Food and Environmental Quality Laboratory
  100 Sprout Road
  Richland, WA 99352-1643
  1-509-372-7462 (phone)
  1-509-372-7460 (fax)

- Washington Department of Health
  1-800-525-0127
  1-360-236-3360 (Pesticide Division)
  1-888-586-9427 (toll free)

Nationwide

- National Pesticide Information Center
  1-800-858-PEST (7378)
  http://npic.orst.edu/

- Extension Toxicology Network (EXTOXNET)
  http://ace.orst.edu/info/extoxnet/

- DuPont Agricultural Products
  P.O. Box 80038 Wilmington, DE 19880-0038
  1-800-441-7515
  1-800-441-3637 (emergency phone)
  1-302-992-2276 (fax)

Compiled by D. Buchwalter, J. Jenkins, N. Kerkvliet, P. Thompson 12/96
Updated by W. Trevathan 11/02

Escort XP

Active Ingredient

Metsulfuron Methyl

DuPont™ Escort® XP

herbicide

GROUP	2	HERBICIDE

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%
Other Ingredients	40%
TOTAL	100%

EPA Reg. No. 352-439 EPA Est. No. _____

Nonrefillable Container
Net: _____

OR

Refillable Container
Net: _____

KEEP OUT OF REACH OF CHILDREN

CAUTION

Si usted no entiende la etiqueta, busque a alguien para que se la explique a usted en detalle. (If you do not understand this label, find someone to explain it to you in detail.)

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 (PPE)

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 exist, 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 cleaning equipment or disposing of equipment washwaters or rinsate.

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

DIRECTIONS FOR USE

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

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

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

PRODUCT INFORMATION

ESCORT® XP herbicide is a dispersible granule that is mixed in water and applied as a spray by ground or aerial application.

ESCORT® XP is registered for the control of annual and perennial weeds and unwanted woody plants on private, public and military lands, on rights-of-way, industrial sites, non-crop areas, ditchbanks of dry drainage ditches, certain types of unimproved turf grass, and conifer and hardwood plantations, including grazed areas on these sites. Do not use on irrigation ditches.

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 non-crop 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.

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

ADJUVANTS

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.

INVASIVE SPECIES MANAGEMENT

This product may be considered for use on public, private, and tribal lands to treat certain weed species infestations that have been determined to be invasive, consistent with the Federal Interagency Committee for the Management of Noxious and Exotic Weeds (FICMNEW) National Early Detection and Rapid Response (EDRR) System for invasive plants.

Effective EDRR systems address invasions by eradicating the invader where possible, and controlling them when the invasive species is too established to be feasibly eradicated. Once an EDRR assessment has been completed and action is recommended, a Rapid Response needs to be taken to quickly contain, deny reproduction, and if possible eliminate the invader. Consult your appropriate state extension service, forest service, or regional multidisciplinary invasive species management coordination team to determine the appropriate Rapid Response.

RESISTANCE

DuPont™ ESCORT® XP which contains the active ingredient metsulfuron methyl is a Group 2 herbicide based on the mode of action classification system of the Weed Science Society of America.

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.

PREPARING FOR USE - Site Specific Considerations

Understanding the risks associated with the application of ESCORT® XP is essential to aid in preventing off-site injury to desirable vegetation and agricultural crops. The risk of off-site movement both during and after application may be affected by a number of site specific factors such as the nature, texture and stability of the soil, the intensity and direction of prevailing winds, vegetative cover, site slope, rainfall, drainage patterns, and other local physical and environmental conditions. A careful evaluation of the potential for off-site movement from the intended application site, including movement of treated soil by wind or water erosion, must be made prior to using ESCORT® XP. This evaluation is particularly critical where desirable vegetation or crops are grown on neighboring land for which the use of ESCORT® XP is not labeled. If prevailing local conditions may be expected to result in off-site movement and cause damage to neighboring desirable vegetation or agricultural crops, do not apply ESCORT® XP.

Before applying ESCORT® XP the user must read and understand all label directions, precautions and restrictions completely, including these requirements for a site specific evaluation. If you do not understand any of the instructions or precautions on the label, or are unable to make a site specific evaluation yourself, consult your local agricultural dealer, cooperative extension service, land managers, professional consultants, or other qualified authorities familiar with the area to be treated. If you still have questions regarding the need for site specific considerations, please call 1-888-6-DUPONT.

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

DuPont™ ESCORT® XP is registered 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 specified 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 may be used in combination with ESCORT® XP.

Glyphosate (4 pound active per gallon)

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

Imazapyr (4 pound active per gallon)

Tank mix 1 to 2 ounces of ESCORT® XP with 10 to 24 fluid ounces of imazapyr 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.

Glyphosate (4 pound active per gallon) + Imazapyr (4 pound active per gallon)

Tank mix 1/2 to 1 ounce of ESCORT® XP with 16 to 64 fluid ounces of glyphosate and 10 to 12 fluid ounces of imazapyr 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 DuPont™ ESCORT® XP per acre with VELPAR® L or VELPAR® DF at the rates specified 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 may be used 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 may be used in combination with ESCORT® XP.

Imazapyr (4 pound active per gallon)

Tank mix 1 to 2 ounces of ESCORT® XP with 8 to 16 fluid ounces of imazapyr per acre for application to loblolly pine. Refer to the imazapyr 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 specified 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 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 may be used in combination with ESCORT® XP.

Imazapyr (4 pound active per gallon)

Tank mix 1/2 to 1 ounce of ESCORT® XP with 4 fluid ounces of imazapyr per acre. The tank mix may be used on loblolly 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 specified on the container for various soil textures. This combination may be applied to loblolly and slash pines.

Release - Directed Spray in Conifers

Western US

To release conifers from competing brush species, such as, blackberry, salmonberry, snowberry, thimbleberry and wild roses, mix 2 to 4 ounces of ESCORT® XP per 100 gallons of spray solution. Direct spray onto the foliage of competing brush species using a knapsack or backpack sprayer. For best results, apply any time after the brush species have reached full leaf stage but before autumn coloration. For best results at application, the majority of the brush must be less than six feet in height to help ensure adequate spray coverage. Thorough coverage of the target foliage is necessary to optimize results. Care must be taken to direct the ESCORT® XP spray solution away from the conifer foliage.

NOTE:

ESCORT® XP may cause temporary yellowing and or growth suppression when the spray solution contacts conifer foliage. The use of a surfactant with ESCORT® XP may improve brush control results. When using a surfactant with ESCORT® XP, extra precaution must be taken to avoid contact with conifer foliage. Excessive drift onto conifers may result in severe injury.

IMPORTANT PRECAUTIONS—CONIFER PLANTATIONS ONLY

- Applications of DuPont™ 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 must 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 specifications for conifer plantations.

HARDWOOD PLANTATIONS

Application Information

ESCORT® XP may be used 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 specified 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 directed on the package label for "RELEASE--HERBACEOUS WEED CONTROL" in pine plantations in the eastern U.S. Follow the VELPAR® L label directions 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 must 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.

NON-CROP SITES

Application Information

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

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

DuPont™ 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.

NATIVE GRASSES

ESCORT® XP is registered 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.

When used as directed, there are no grazing or haying restrictions for use rates of 1 2/3 ounce per acre or less. At use rates greater than 1 2/3 ounce per acre and up 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.

Rotation Intervals for Overseeding and Renovation

Location	Crop or Grass Species	Maximum ESCORT® XP Rate (oz per A)	Minimum Rotation Interval (months)
AL, AR, FL, GA, KY, LA, MS, NC, OK, SC, TN, TX, VA, WV	Alfalfa, red clover, white clover, sweet clover, bermudagrass, bluegrass, ryegrass, tall fescue	1/10 to 3/10	4
	Wheat (except durum)	1/10 to 3/10	1
	Durum, barley, oat	1/10 to 3/10	10
ALL STATES NOT INCLUDED ABOVE	Red clover, white clover, and sweet clover	1/10 to 2/10	12
	Bermudagrass, bluegrass, ryegrass	1/10 to 2/10	6
	Tall Fescue	1/10 to 2/10	18
	Wheat (except durum)	1/10 to 2/10	1
	Durum, barley, oat	1/10 to 2/10	10
ALL AREAS WITH SOIL PH OF 7.5 OR LESS	Russian wildrye	1/10 to 1/2	1
	Green needlegrass, switchgrass, sheep fescue	1/10 to 1	1
	Meadow brome, smooth brome, alta fescue, red fescue, meadow foxtail, orchardgrass, Russian wildrye, timothy	1/10 to 1	2
ALL AREAS WITH SOIL PH OF 7.9 OR LESS	Alkali sacoton, mountain brome, blue grama thickspike wheatgrass	1/10 to 1	1
	Sideoats grama, switchgrass	1/10 to 1/2	2
	Western wheatgrass	1/10 to 1	2
	Sideoats grama, switchgrass, big bluestem	1/10 to 1	3

Application Information

Apply DuPont™ 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. 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. Injury may result when ESCORT® XP is applied to grass that is stressed by severe weather conditions, drought, low fertility, water-saturated soils, disease, or insect damage. Severe winter stress, drought, disease, or insect damage before or following application also may result in grass injury.

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 listed 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
Grama, Blue	1/2—2	1
Grama, 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 specified intervals are for applications made in the Spring to early Summer. Because DuPont™ 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 must be performed, or previous experience may be used, to determine the feasibility of replanting treated sites.

ADDITIONAL GRASS INFORMATION

APPLICATION INFORMATION FOR GRASS ESTABLISHMENT

ESCORT® XP may be used for the control or suppression of broadleaf weeds to aid in the establishment of the following perennial native or improved grasses:

Blue Grama
Bluestems –
big
little
plains
sand
WW spar
Buffalograss
Green sprangletop
Kleingrass
Lovegrassess –
atherstone
sand
weeping
wilman
Orchardgrass
Sideoats grama
Switchgrass –
blackwell
Wheatgrasses –
bluebunch
crested
intermediate
pubescent
Siberian
slender
steambank
tall
thickspike
Western
Wildrye grass –
Russian

Maximize potential for grass establishment by consulting with the Natural Resource and Conservation Service of other government agencies or local experts concerning planting techniques and other cultural practices.

Performance from ESCORT® XP may not always be satisfactory due to the inability of newly planted grass stands to sufficiently compete with weeds, and the severity of weed pressure in new grass stands.

An additional herbicide application or mowing may be needed.

Use Rates and Application Timing for Grass Establishment Preplant (prior to planting) or Preemergence (after planting but before grass emergence)

Do not use more than 1/10 ounce per acre of ESCORT® XP for grass establishment.

Apply ESCORT® XP at 1/10 ounce per acre on all labeled grasses except orchardgrass and Russian wildrye grass. Do not apply ESCORT® XP preplant or preemergence to orchardgrass and Russian wildrye grass as severe crop injury may result.

Early postemergence to new plantings

Apply ESCORT® XP at 1/10 ounce per acre, plus a non-ionic surfactant at the rate of 2 to 4 pints per 100 gallons of spray solution on all labeled grasses anytime after grass emergence.

Do not use a spray adjuvant other than non-ionic surfactant.

Because grass species differ in time of emergence, apply only after the majority of grasses are in the 3 to 4 leaf stage.

Postemergence to stands with 1 – 5 leaf grasses planted the previous season

Apply DuPont™ ESCORT® XP at 1/10 ounce per acre plus a non-ionic surfactant at the rate of 2 to 4 pints per 100 gallons of spray solution, on all labeled grasses when the majority of the grasses have one or more leaves.

Do not use a spray adjuvant other than non-ionic surfactant.

APPLICATION INFORMATION FOR ESTABLISHED GRASSES

Use Rates for Established Grasses

Apply up to 1 ounce ESCORT® XP per acre as a broadcast application to established grasses. For spot applications, use 1 ounce per 100 gallons of water. Do not apply more than 1 2/3 ounces of ESCORT® XP per acre per year.

Refer to the Weeds Controlled section of this label for a listing of the weeds controlled by ESCORT® XP and the appropriate use rate to obtain control.

Application Timing – Established Grasses

ESCORT® XP may be applied to established native grasses such as bluestems and grama, and on other established grasses such as bermudagrass, bluegrass, orchardgrass, bromegrass, fescue and timothy that were planted the previous growing season (or earlier) and are fully tillered, unless otherwise directed on this label. Specific application timing information on several of these grass species follows:

Grass	Minimum time from Grass establishment ESCORT® XP application
Bermudagrass	2 months
Bluegrass, bromegrass, Orchardgrass	6 months
Timothy	12 months
Fescue	24 months

Fescue and Timothy Precautions

When used on fescue and timothy grasses, ESCORT® XP may cause reduced first cutting yields due to temporary stunting, leaf yellowing, or seed head suppression. To help minimize these symptoms, follow the information below:

- Use the lowest labeled rate for the target weeds
- Tank mix 2,4-D with ESCORT® XP applications
- Apply ESCORT® XP at no more than 4/10 ounce per acre
- Make applications when the grasses are 5 to 6 inches tall in late summer or fall
- Use only a non-ionic surfactant at 1/2 pint per 100 gallons of spray solution
- When liquid nitrogen is the spray carrier, do not include the surfactant

Other Grasses:

Application of ESCORT® XP to Pensacola bahiagrass, ryegrass (Italian or perennial) and Garrison's creeping foxtail may cause severe injury to and/or loss of forage.

Varieties and species of forage grasses differ in their tolerance to herbicides. When using ESCORT® XP on a particular grass for the first time, limit use to a small area. In no injury occurs throughout the season, larger acreage may be treated the following season.

Broadleaf forage species, such as alfalfa and clover, are highly sensitive to ESCORT® XP and will be severely stunted or injured by ESCORT® XP.

CROP ROTATION

Before using ESCORT® XP, carefully consider your crop rotation plans and options.

Minimum Rotational Intervals

Minimum rotation intervals* are determined by the rate of breakdown of ESCORT® XP applied. ESCORT® XP breakdown in the soil is affected by soil pH, presence of soil microorganisms, soil temperature, and soil moisture. Low soil pH, high soil temperature, and high soil moisture increase ESCORT® XP breakdown in soil, while high soil pH, low soil temperature, and low soil moisture slow ESCORT® XP breakdown.

Of these 3 factors, only soil pH remains relatively constant. Soil temperature, and to a greater extent, soil moisture, can vary significantly from year to year and from area to area. For this reason, monitor soil temperature and soil moisture on a regular basis when considering any crop rotations.

* The minimum rotation interval represents the period of time from the last application to the anticipated date of the next planting.

Soil pH Limitations

ESCORT® XP must not be used on soils having a pH above 7.9, as extended soil residual activity could extend crop rotation intervals beyond normal. Under certain conditions, ESCORT® XP could remain in the soil for 34 months or more, injuring wheat and barley. In addition, other crops planted in high-pH soils can be extremely sensitive to low concentrations of ESCORT® XP.

Checking Soil pH

Before using DuPont™ ESCORT® XP, determine the soil pH of the areas of intended use. To obtain a representative pH value for the test area, take several 0" to 4" samples from different areas of the field and analyze them separately. Consult local extension publications for additional information on recommended soil sampling procedures.

BIOASSAY

A field bioassay must be completed before rotating to any crop or grass species/variety not listed in the Rotation Intervals Table, or if the soil pH is not in the specified range, or if the use rate applied is not specified in the table.

To conduct a field bioassay, grow test strips of the crop(s) orgrass(es) you plan to grow the following year in fields previously treated with ESCORT® XP. Crop or grass response to the bioassay will indicate whether or not to rotate to the crop(s) or grass(es) grown in the test strips.

If a field bioassay is planned, check with your local Agricultural dealer or DuPont representative for information detailing the field bioassay procedure.

IMPORTANT PRECAUTIONS

- Grass species or varieties may differ in their response to various herbicides. 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 applied to grass that is stressed by severe weather conditions, drought, low fertility, water-saturated soils, disease, or insect damage can result in grass injury. Severe winter stress, drought, disease, or insect damage before or following application also may result in grass injury.
- Applications of ESCORT® XP to lands undersown with legumes may cause injury to the legumes. Legumes in a seeding mixture may be severely injured or killed following an application of ESCORT® XP.
- The control of weeds in wheel track areas may be reduced if ground applications are made when dry, dusty field conditions exist. The addition of 2,4-D or MCPA may improve weed control under these conditions.

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
Garlic mustard
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**

2 ounces per acre

Onionweed

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 may be used.

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

INDUSTRIAL TURFGRASS UNIMPROVED ONLY

Application Information

ESCORT® XP is registered for selective weed control in unimproved industrial turfgrass where certain grasses are well established and desired as ground cover. ESCORT® XP may also be used for the control of certain noxious and troublesome weeds in turfgrass.

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 application rates:

Turfgrass Type	Rate of DuPont™ 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 may be used for growth suppression and seedhead inhibition in well established fescue and bluegrass turfgrass 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.

IMPORTANT PRECAUTIONS —INDUSTRIAL TURFGRASS ONLY

- An application of ESCORT® XP may cause temporary discoloration (chlorosis) or stunting of the turfgrasses. Use the lower specified rates for minimum discoloration or stunting.
- 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 turfgrass.
- Excessive injury may result when ESCORT® XP is applied to turfgrass that is under stress from drought, insects, disease, cold temperatures (winter injury) or poor fertility.
- ESCORT® XP is not recommended for use on bahiagrass.

BRUSH CONTROL

Application Information

ESCORT® XP is registered for the control of undesirable brush growing in non-crop areas including grazed areas on these sites. 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 must 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
Wild roses	1/2—1	1—3
Willow	1/2—1	1—3
Yellow poplar	1/2—1	1—3

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

Application Timing

Make a foliar application of the specified 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.

Spot Treatment

ESCORT® XP may be used for the control of many species of weeds including noxious/invasive weeds in certain established grasses growing on non-crop areas.

Refer to the "Weeds Controlled" section for a listing of susceptible weed species and the application rate per acre per the target weed.

Or, mix one gram of ESCORT® XP per one gallon of water along with a surfactant. Spray to the point of wetting the entire surface of the target weeds, approximately 40 gallons of solution per acre.

Tank Mix Combinations—

ESCORT® XP may be tank mixed with any product labeled for non-crop 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

Imazapyr (2 pound active per gallon)

Combine 1 to 2 ounces of ESCORT® XP with 1 to 4 pints of imazapyr herbicide per acre and apply as a broadcast spray. For aerial applications 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.

Picloram (2 pound active per gallon) + Imazapyr (2 pound active per gallon)

Combine 1 to 1 1/2 ounce of ESCORT® XP with 2 to 8 fluid ounces of imazapyr and 1 to 2 pints of picloram 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.

*Picloram is a restricted use pesticide.

Spotgun Basal Soil Treatment

For control of multiflora rose, prepare a spray suspension of DuPont™ 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.

For best results, make applications 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

Low rates of ESCORT® XP can kill or severely injure most crops. Following an ESCORT® XP application, the use of spray equipment to apply other pesticides to crops on which ESCORT® XP is not registered may result in their damage. The most effective way to reduce this crop damage potential is to use dedicated mixing and application equipment.

MIXING INSTRUCTIONS

1. Fill the tank 1/4 to 1/3 full of water.
2. While agitating, add the required amount of 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 must 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.

PRODUCT PRECAUTIONS

- When used as directed, there is no grazing or haying restriction for use rates of 1 2/3 ounce per acre or less. At use rates greater than 1 2/3 ounce per acre and up 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.
- Injury to or loss of desirable trees or other plants may result if spray equipment is drained or flushed on or near these trees or 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.
- 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 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 or snow covered soil.
- Leave treated soil undisturbed to reduce the potential for ESCORT® XP movement by soil erosion due to wind or water.

PRODUCT RESTRICTIONS

- Do not use on lawns, walks, driveways, tennis courts or similar areas.
- Do not apply through any type of irrigation system.
- 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.

SPRAYER CLEANUP

Spray equipment must be cleaned before DuPont™ 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.

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 gallon of ammonia (contains 3% active minimum) for every 100 gallons 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 minutes. 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. Dispose of the rinsate on a labeled site or at an approved waste disposal facility. If a commercial cleaner is used follow the commercial cleaner directions for rinsate disposal.

Notes:

1. Mixing chlorine bleach with ammonia can cause dangerous gases to form. Clean spray equipment outdoors.
2. Use steam cleaning or other commercial cleaners to facilitate the removal of any caked pesticide deposits.
3. When ESCORT® XP is tank mixed with other pesticides, all cleanout procedures for each product must be examined and the most rigorous procedure must be followed.
4. In addition to this cleanout procedure, all pre-cleanout guidelines on subsequently applied products must be followed as per the individual product 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 drift management strategy is to apply the largest droplets which are consistent with pest control objectives. 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.

A droplet size classification system describes the range of droplet sizes produced by spray nozzles. The American Society of Agricultural and Biological Engineers (ASABE) provide a Standard that describes droplet size spectrum categories defined by a number of reference nozzles (fine, coarse, etc.). Droplet spectra resulting from the use of a specific nozzle may also be described in terms of volume mean diameter (VMD). Coarser droplet size spectra have larger VMD's and lower drift potential.

Controlling Droplet Size - General Techniques

- Nozzle Type - Select a nozzle type that is designed for the intended application. With most nozzle types, narrower spray angles produce larger droplets. The use of low-drift nozzles will reduce drift potential.
- Pressure - The lowest spray pressures recommended for the nozzle produce the largest droplets. Higher pressure reduces droplet size and does not improve canopy penetration. When higher flow rates are needed, using a higher-capacity nozzle instead of increasing pressure results in the coarsest droplet spectrum.
- Flow Rate/Orifice Size - Using the highest flow rate nozzles (largest orifice) that are consistent with pest control objectives reduces the potential for spray drift. Nozzles with higher rated flows produce coarser droplet spectra.

Controlling Droplet Size - Aircraft

- Nozzle Type - Solid stream, or other low drift nozzles produce the coarsest droplet spectra.
- Number of Nozzles - Using the minimum number of nozzles with the highest flow rate that provide uniform coverage will produce a coarser droplet spectrum
- Nozzle Orientation - Orienting nozzles in a manner that minimizes the effects of air shear will produce the coarsest droplet spectra. For some nozzles such as solid stream, pointing the nozzles straight back parallel to the airstream will produce a coarser droplet spectrum than other orientations.
- Pressure – Selecting the pressure that produces the coarsest droplet spectrum for a particular nozzle and airspeed reduces spray drift potential. For some nozzle types such as solid streams, lower pressures can produce finer droplet spectra and increase drift potential

BOOM LENGTH (AIRCRAFT), AND APPLICATION HEIGHT

- Boom Length (aircraft) - Using shorter booms decreases drift potential. Boom lengths are expressed as a percentage of an aircraft's wingspan or a helicopter's rotor blade diameter. Shorter boom length and proper positioning can minimize drift caused by wingtip or rotor vortices.
- Application Height (aircraft) - Applications made at the lowest height that are consistent with pest control objectives and the safe operation of the aircraft will reduce the potential for spray drift.
- Application Height (ground) - Applications made at the lowest height consistent with pest control objectives, and that allow the applicator to keep the boom level with the application site and minimize bounce, will reduce the exposure of spray droplets to evaporation and wind, and reduce spray drift potential.

WIND

Drift potential is lowest when applications are made in light to gentle sustained winds (2-10 mph), which are blowing in a constant direction. Many factors, including droplet size and equipment type also determine drift potential at any given wind speed. AVOID GUSTY OR WINDLESS CONDITIONS.

Local terrain can also influence wind patterns. Every applicator is expected to be familiar with local wind patterns and how they affect spray drift.

TEMPERATURE AND HUMIDITY

Setting up equipment to produce larger droplets to compensate for droplet evaporation can reduce spray drift potential. Droplet evaporation is most severe when conditions are both hot and dry.

SURFACE TEMPERATURE INVERSIONS

Drift potential is high during a surface temperature inversion. Surface inversions restrict vertical air mixing, which may cause small suspended droplets to remain close to the ground and move laterally in a concentrated cloud. Surface 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. Mist or fog may indicate the presence of an inversion in humid areas. Inversions may also be identified by producing smoke and observing its behavior. Smoke that remains close to the ground, or moves laterally in a concentrated cloud under low wind conditions indicates a surface inversion. 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 minimizing drift potential, and not interfering with uniform deposition of the product.

AIR ASSISTED (AIR BLAST) FIELD CROP SPRAYERS

Air assisted field crop sprayers carry droplets to the target via a downward directed air stream. Some may reduce the potential for drift, but if a sprayer is unsuitable for the application and/or set up improperly, high drift potential can result. It is the responsibility of the applicator to determine that a sprayer is suitable for the intended application, that it is configured properly, and that drift potential has been minimized.

Note: Air assisted field sprayers can affect product performance by affecting spray coverage and canopy penetration. Read the specific crop use and application equipment instructions to determine if an air assisted field crop sprayer can be used.

SENSITIVE AREAS

Making applications when there is a sustained wind moving away from adjacent sensitive areas (e.g., residential areas, bodies of water, known habitat for threatened or endangered species, non-target crops) is an effective way to minimize the effect of spray drift.

DRIFT CONTROL ADDITIVIES

Using product compatible drift control additives can reduce drift potential. When a drift control additive is used, read and carefully observe cautionary statements and all other information on the additive's label. If using an additive that increases viscosity, ensure that the nozzles and other application equipment will function properly with a viscous spray solution. Preferred drift control additives have been certified by the Chemical Producers and Distributors Association (CPDA).

STORAGE AND DISPOSAL

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

Pesticide Storage: Store product in original container only. Store in a cool, dry place.

Pesticide Disposal: Waste resulting from the use of this product must be disposed of on site or at an approved waste disposal facility.

Container Handling:

Refer to the Net Contents section of this product's labeling for the applicable "Nonrefillable Container" or "Refillable Container" designation.

Nonrefillable Plastic and Metal Containers (Capacity Equal to or Less Than 50 Pounds): Nonrefillable container. Do not reuse or refill this container. Triple rinse container (or equivalent) promptly after emptying. Triple rinse as follows: Empty the remaining contents into application equipment or a mix tank. Fill the container 1/4 full with water and recap. Shake for 10 seconds. Pour rinsate into application equipment or a mix tank or store rinsate for later use or disposal. Drain for 10 seconds after the flow begins to drip. Repeat this procedure two more times. Then, for Plastic Containers, offer for recycling if available or puncture and dispose of in a sanitary landfill, or by incineration. Do not burn, unless allowed by state and local ordinances. For Metal Containers, offer for recycling if available or reconditioning if appropriate, or puncture and dispose of in a sanitary landfill, or by other procedures approved by state and local authorities.

Nonrefillable Plastic and Metal Containers (Capacity Greater Than 50 Pounds): Nonrefillable container. Do not reuse or refill this container. Triple rinse container (or equivalent) promptly after emptying. Triple rinse as follows: Empty the remaining contents into application equipment or a mix tank. Fill the container 1/4 full with water. Replace and tighten closures. Tip container on its side and roll it back and forth, ensuring at least one complete revolution, for 30 seconds. Stand the container on its end and tip it back and forth several times. Turn the container over onto its other end and tip it back and forth several times. Empty the rinsate into application equipment or a mix tank or store rinsate for later use or disposal. Repeat this procedure two more times. Then, for Plastic Containers, offer for recycling if available or puncture and dispose of in a sanitary landfill, or by incineration. Do not burn, unless allowed by state and local ordinances. For Metal Containers, offer for recycling if available or reconditioning if appropriate, or puncture and dispose of in a sanitary landfill, or by other procedures approved by state and local authorities.

Nonrefillable Plastic and Metal Containers, e.g., Intermediate Bulk Containers [IBC] (Size or Shape Too Large to be Tipped, Rolled or Turned Upside Down): Nonrefillable container. Do not reuse or refill this container. Clean container promptly after emptying the contents from this container into application equipment or mix tank and before final disposal using the following pressure rinsing procedure. Insert a lance fitted with a suitable tank cleaning nozzle into the container and ensure that the water spray thoroughly covers the top, bottom and all sides inside the container. The nozzle manufacturer generally provides instructions for the appropriate spray pressure, spray duration and/or spray volume. If the manufacturer's instructions are not available, pressure rinse the container for at least 60 seconds using a minimum pressure of 30 PSI with a minimum rinse volume of 10% of the container volume. Drain, pour or pump rinsate into application equipment or rinsate collection system. Repeat this pressure rinsing procedure two more times. Then, for Plastic Containers, offer for recycling if available or puncture and dispose of in a sanitary landfill, or by incineration. For Metal Containers, offer for recycling if available or reconditioning if appropriate, or puncture and dispose of in a sanitary landfill, or by other procedures approved by state and local authorities.

Nonrefillable Paper or Plastic Bags, Fiber Sacks including Flexible Intermediate Bulk Containers (FIBC) or Fiber Drums With Liners: Nonrefillable container. Do not reuse or refill this container. Completely empty paper or plastic bag, fiber sack or drum liner by shaking and tapping sides and bottom to loosen clinging particles. Empty residue into application or manufacturing equipment. Then offer for recycling if available or dispose of empty paper or plastic bag, fiber sack or fiber drum and liner in a sanitary landfill, or by incineration. Do not burn, unless allowed by state and local ordinances.

Refillable Fiber Drums With Liners: Refillable container (fiber drum only). Refilling Fiber Drum: Refill this fiber drum with DuPont™ ESCORT® XP containing metsulfuron methyl only. Do not reuse this fiber drum for any other purpose. Cleaning before refilling is the responsibility of the refiller. Completely empty liner by shaking and tapping sides and bottom to loosen clinging particles. Empty residue into application or manufacturing equipment. Disposing of Fiber Drum and/or Liner: Do not reuse this fiber drum for any other purpose other than refilling (see preceding). Cleaning the container (liner and/or fiber drum) before final disposal is the responsibility of the person disposing of the container. Offer the liner for recycling if available or dispose of liner in a sanitary landfill, or by incineration. Do not burn, unless allowed by state and local ordinances. If drum is contaminated and cannot be reused, dispose of it in the manner required for its liner. To clean the fiber drum before final disposal, completely empty the fiber drum by shaking and tapping sides and bottom to loosen clinging particles. Empty residue into application or manufacturing equipment. Then offer the fiber drum for recycling if available or dispose of in a sanitary landfill, or by incineration. Do not burn, unless allowed by state and local ordinances.

All Other Refillable Containers: Refillable container. Refilling Container: Refill this container with DuPont™ ESCORT® XP containing metsulfuron methyl only. Do not reuse this container for any other purpose. Cleaning before refilling is the responsibility of the refiller. Prior to refilling, inspect carefully for damage such as cracks, punctures, abrasions, worn out threads and closure devices. If damage is found, do not use the container, contact DuPont at the number below for instructions. Check for leaks after refilling and before transporting. If leaks are found, do not reuse or transport container, contact DuPont at the number below for instructions. Disposing of Container: Do not reuse this container for any other purpose other than refilling (see preceding). Cleaning the container before final disposal is the responsibility of the person disposing of the container. To clean the container before final disposal, use the following pressure rinsing procedure. Insert a lance fitted with a suitable tank cleaning nozzle into the container and ensure that the water spray thoroughly covers the top, bottom and all sides inside the container. The nozzle manufacturer generally provides instructions for the appropriate spray pressure, spray duration and/or spray volume. If the manufacturer's instructions are not available, pressure rinse the container for at least 60 seconds using a minimum pressure of 30 PSI with a minimum rinse volume of 10% of the container volume. Drain, pour or pump rinsate into application equipment or rinsate collection system. Repeat this pressure rinsing procedure two more times. Then, for Plastic Containers, offer for recycling if available or puncture and dispose of in a sanitary landfill, or by incineration. Do not burn, unless allowed by state and local ordinances. For Metal Containers, offer for recycling if available or reconditioning if appropriate, or puncture and dispose of in a sanitary landfill, or by other procedures approved by state and local authorities.

Outer Foil Pouches of Water Soluble Packets (WSP): Nonrefillable container. Do not reuse or refill this container. Offer for recycling if available or, dispose of the empty outer foil pouch in the trash as long as WSP is unbroken. If the outer pouch contacts the formulated product in any way, the pouch must be triple rinsed with clean water. Add the rinsate to the spray tank and dispose of the outer pouch as described previously.

Do not transport if this container is damaged or leaking. If the container is damaged, leaking or obsolete, or in the event of a major spill, fire or other emergency, contact DuPont at 1-800-441-3637, day or night.

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

SL - 1612A 052912 02-29-12

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. 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.

TO THE EXTENT CONSISTENT WITH APPLICABLE LAW, DUPONT MAKES NO OTHER EXPRESS OR IMPLIED WARRANTY OF FITNESS OR OF MERCHANTABILITY OR ANY OTHER EXPRESS OR IMPLIED WARRANTY. TO THE EXTENT CONSISTENT WITH APPLICABLE LAW, 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. TO THE EXTENT CONSISTENT WITH APPLICABLE LAW, 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.

To the extent consistent with applicable law that allows such requirement, 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 [1-888-638-7668]

Internet address: http://cropprotection.dupont.com/

Material Safety Data Sheet

DuPont™ Escort® XP Herbicide

Version 2.1

Revision Date 04/26/2012 Ref. 130000036195

This SDS adheres to the standards and regulatory requirements of the United States and may not meet the regulatory requirements in other countries.

SECTION 1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	DuPont™ Escort® XP Herbicide
Tradename/Synonym	:	DPX-T6376 60 XP Metsulfuron Methyl 60 XP Escort 60 XP B11495142 METSULFURON METHYL (Methyl 2-[[[[(4-methoxy-6-methyl-1,3,-triazin-2-yl)amino]carbonyl]amino]sulfonyl]benzoate)
MSDS Number	:	130000036195
Product Use	:	Herbicide
Manufacturer	:	DuPont 1007 Market Street Wilmington, DE 19898
Product Information	:	1-800-441-7515 (outside the U.S. 1-302-774-1000)
Medical Emergency	:	1-800-441-3637 (outside the U.S. 1-302-774-1139)
Transport Emergency	:	CHEMTREC: 1-800-424-9300 (outside the U.S. 1-703-527-3887)

SECTION 2. HAZARDS IDENTIFICATION

Emergency Overview

CAUTION!

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

Potential Health Effects

This section includes potential acute adverse effects which could occur if this material is not used according to the label.

Eyes : May cause: Irritation with discomfort, pain, redness, or visual impairment.

Carcinogenicity

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

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Component	CAS-No.	Concentration
Metsulfuron methyl	74223-64-6	60 %
Other Ingredients		40 %

SECTION 4. FIRST AID MEASURES

Skin contact : Take off all contaminated clothing immediately. Rinse skin immediately with plenty of water for 15-20 minutes. Call a poison control center or doctor for treatment advice.

Eye contact : 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 treatment advice.

Inhalation : No specific intervention is indicated as the compound is not likely to be hazardous. Consult a physician if necessary.

Ingestion : No specific intervention is indicated as the compound is not likely to be hazardous. Consult a physician if necessary.

General advice : Have the product container or label with you when calling a poison control center or doctor, or going for treatment.
For medical emergencies involving this product, call toll free 1-800-441-3637.
See Label for Additional Precautions and Directions for Use.

Notes to physician : Treat symptomatically.

SECTION 5. FIREFIGHTING MEASURES

Flammable Properties Flash point	:	not applicable
Suitable extinguishing media	:	Water spray, Dry chemical, Foam, Carbon dioxide (CO2)
Unsuitable extinguishing media	:	High volume water jet, (contamination risk)
Firefighting Instructions	:	In the event of fire, wear self-contained breathing apparatus. Wear full protective equipment. (on small fires) If area is heavily exposed to fire and if conditions permit, let fire burn itself out since water may increase the area contaminated. Cool containers / tanks with water spray.

SECTION 6. ACCIDENTAL RELEASE MEASURES

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

Safeguards (Personnel)	:	Evacuate personnel, thoroughly ventilate area, use self-contained breathing apparatus.
Spill Cleanup	:	Sweep up and shovel into suitable containers for disposal. If spill area is on ground near valuable plants or trees, remove 5 cm of top soil after initial clean-up.
Accidental Release Measures	:	Prevent material from entering sewers, waterways, or low areas. Never return spills in original containers for re-use. Dispose of in accordance with local regulations.

SECTION 7. HANDLING AND STORAGE

Handling (Personnel)	:	Wash hands thoroughly with soap and water after handling and before eating,

drinking, chewing gum, using tobacco, or using the toilet.

Storage : Do not contaminate water, other pesticides, fertilizer, food or feed in storage. Store in original container. Store in a cool, dry place. Keep out of the reach of children.

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Personal protective equipment

Skin and body protection : Applicators and other handlers must wear:
Long sleeved shirt and long pants
Shoes plus socks
Personal protective equipment required for early entry:
Coveralls
Shoes plus socks

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

Exposure Guidelines

Exposure Limit Values

Metsulfuron methyl

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.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Form	:	solid, granular
Color	:	light brown
Odor	:	odourless
pH	:	5.0
Specific gravity	:	1.47 at 25 °C (77 °F)
Bulk density	:	0.64 - 0.74 g/ml

Water solubility	:	Tapped dispersible

SECTION 10. STABILITY AND REACTIVITY

Stability	:	Stable at normal temperatures and storage conditions.
Conditions to avoid	:	None reasonably foreseeable.
Incompatibility	:	No materials to be especially mentioned.

SECTION 11. TOXICOLOGICAL INFORMATION

DuPont™ Escort® XP Herbicide

Dermal LD50	:	> 5,000 mg/kg , rat
Oral LD50	:	> 5,000 mg/kg , rat
Skin irritation	:	No skin irritation, rabbit
Eye irritation	:	slight irritation, rabbit
Sensitisation	:	Animal test did not cause sensitization by skin contact., guinea pig

Metsulfuron methyl

Inhalation 4 h LC50	:	> 5.0 mg/l , rat
Repeated dose toxicity	:	The following effects occurred at levels of exposure that significantly exceed those expected under labeled usage conditions. Oral rat Reduced body weight gain, Organ weight changes, Liver Dermal rabbit

Skin irritation

Carcinogenicity	:	Did not show carcinogenic effects in animal experiments.
Mutagenicity	:	Did not show mutagenic effects in animal experiments.
		Did not cause genetic damage in cultured bacterial cells.
		Genetic damage in cultured mammalian cells was observed in some laboratory tests but not in others.
Reproductive toxicity	:	Animal testing did not show any effects on fertility.
Teratogenicity	:	Animal testing showed no developmental toxicity.

SECTION 12. ECOLOGICAL INFORMATION

Aquatic Toxicity
Metsulfuron methyl

96 h LC50	:	Oncorhynchus mykiss (rainbow trout) > 150 mg/l
96 h LC50	:	Lepomis macrochirus (Bluegill sunfish) > 150 mg/l
72 h EC50	:	Anabaena flos-aquae (cyanobacteria) 0.066 mg/l
14 d EC50	:	Lemna minor 0.00036 mg/l
48 h EC50	:	Daphnia magna (Water flea) > 120 mg/l
Additional ecological information	:	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 cleaning equipment or disposing of equipment washwaters or rinsate.

SECTION 13. DISPOSAL CONSIDERATIONS

Waste Disposal : Do not contaminate water, food or feed by disposal. Wastes resulting from the

use of this product must be disposed of on site or at an approved waste disposal facility.

Container Disposal : Refer to the product label for instructions.
Do not transport if this container is damaged or leaking.

In the event of a major spill, fire or other emergency, call 1-800-441-3637 day or night.

SECTION 14. TRANSPORT INFORMATION

IATA_C	UN number	: 3077
	Proper shipping name	: Environmentally hazardous substance, solid, n.o.s. (Metsulfuron methyl)
	Class	: 9
	Packing group	: III
	Labelling No.	: 9MI
IMDG	UN number	: 3077
	Proper shipping name	: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Metsulfuron methyl)
	Class	: 9
	Packing group	: III
	Labelling No.	: 9
	Marine pollutant	: yes (Metsulfuron methyl)

Not regulated as a hazardous material by DOT.

SECTION 15. REGULATORY INFORMATION

SARA 313 Regulated Chemical(s) : SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

Title III hazard : Acute Health Hazard: Yes

classification		Chronic Health Hazard: No Fire: No Reactivity/Physical hazard: No Pressure: No
EPA Reg. No.	:	352-439 In the United States this product is regulated by the US Environmental Protection Agency (EPA) under the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA). It is a violation of Federal law to use this product in a manner inconsistent with its labeling. Read and follow all label directions. This product is excluded from listing requirements under EPA/TSCA.
PA Right to Know Regulated Chemical(s)	:	Substances on the Pennsylvania Hazardous Substances List present at a concentration of 1% or more (0.01% for Special Hazardous Substances): Sucrose , Trisodium orthophosphate

SECTION 16. OTHER INFORMATION

		NFPA	HMIS
Health	:	1	1
Flammability	:	1	1
Reactivity/Physical hazard	:	0	0

Contact person : DuPont Crop Protection, Wilmington, DE, 19898, Phone: 1-888-638-7668

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

Significant change from previous version is denoted with a double bar.

DuPont™ Escort® XP Herbicide

Version 2.1

Revision Date 04/26/2012 Ref. 130000036195

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

METSULFURON METHYL

In addition to the review that is presented below, a comprehensive review available from USDA Forest Service provides information that incorporates more recent studies and data. The US Forest Service risk assessment report is available at: http://www.fs.fed.us/foresthealth/pesticide/risk.shtml

Review conducted by MDAR and MassDEP for use in Sensitive Areas of Rights-of-Way in Massachusetts

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 Cr1: 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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101. DuPont Adsorption of 14C DPX-T6376 on Soil (AI'IR-66-82).

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103. DuPont Field Soil Dissipation of [Phenyl (U) - 14C] Metsulfuron Methyl on United States and Canadian Soils (AMR 476-86).

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105. DuPont HLO-61-85; Chronic Feeding Study with Concurrent Two Generation Reproduction Study in Rats - Chronic.

106. DuPont HLO-65-85 Chronic Feeding Reproduction Phase.

107. DuPont HLR-524-84 Two generation, Four Litter Reproductive Study in Rats.

108. DuPont HLR 137-83 Subchronic Dermal Study (21 Days) in Rabbits.

111. DuPont HLR 463-84 Ninety-Day and Long Term Feeding Study in Mice.

112. Ally Herbicide Product Monograph

Extension Service
Department of Agricultural Chemistry
Environmental Toxicology & Chemistry Program
Oregon State University

National Institute of Environmental Health Services
Environmental Health Sciences Center
Community Outreach Program
Oregon State University

Metsulfuron-methyl

Pesticide Fact Sheet: Forestry Use

Product Information

- Metsulfuron-methyl is the common name for the active ingredient in **Escort**, a pre- and post-emergence herbicide commonly used in forestry and right-of-way vegetation management.

- **Escort** (60% metsulfuron-methyl and 40% inert ingredients) is formulated as a dispersible granule that is mixed with water and applied as a foliar spray. The final mix typically includes 0.25 to 0.50% of added surfactant by volume.

- Northwest forestry vegetation managers usually apply 0.3 to 1.2 ounces active ingredient per acre in a water solution.

- Users typically apply metsulfuron-methyl in the spring (when the leaves are fully out) until fall (when colors start to change) to control blackberries and other broadleaf plants.

- For comparative purposes, the Environmental Protection Agency (EPA) categorizes pesticides by their short-term toxicity on a scale of I (most toxic) to IV (least toxic). Most undiluted metsulfuron-methyl formulations are Toxicity Category IV.

Public Health

- Researchers use animal studies to define the potential for a pesticide to cause harmful effects to human health. It is important to know that these tests are carried out using doses high enough to cause toxicity (poisoning). Effects seen at toxic doses in animals are unlikely to occur after short-term, low-level exposure in humans. The level of exposure must be considered to estimate the risk of harmful effects.

- Based on laboratory studies, metsulfuron-methyl is classified as practically non-toxic to mammals on a short term (acute) basis.

- Metsulfuron-methyl is broken down quickly and eliminated from the body. Laboratory rats dosed with metsulfuron-methyl eliminated 91% of the pesticide in 96 hours.

- There is no evidence that metsulfuron-methyl causes birth defects, reproductive problems, nerve damage, or cancer.

Wildlife Effects

- Based on laboratory and field studies, metsulfuron-methyl is classified as practically non-toxic to fish, birds, and bees on a short term (acute) basis.

- Metsulfuron-methyl is not expected to bioaccumulate in mammals.

Environmental Fate

- Metsulfuron-methyl is stable to breakdown by water (hydrolysis) at neutral and alkaline pHs. It has an estimated 3-week half-life in water at acidic pH.

- Warm, moist conditions promote metsulfuron-methyl activity. Cold, dry weather will reduce or delay activity.

- The half-life of metsulfuron-methyl in soil ranges from 14 to 180 days, with a typical half-life of 30 days. The breakdown of metsulfuron-methyl in soils is largely dependent on soil temperature, soil moisture content, and soil pH. Metsulfuron-methyl degrades faster under acidic conditions and in soils with high moisture content and high temperature. Metsulfuron-methyl is more mobile in alkaline soils than in acidic soils.

- Metsulfuron-methyl is stable in the presence of sunlight.

- Metsulfuron-methyl is biologically active at low concentrations, and small amounts of drift can cause damage to adjacent plants or trees. Note that drift damage to plants is not a good indicator of human health risks because the chemical's mode of action is specific to plants.

- Metsulfuron-methyl is classified as highly mobile and can travel through soil with water and enter groundwater. It can also move with runoff and enter surface water. Its low application rates minimize

potential impacts on surface or groundwater. Right-of-way uses should be evaluated for potential surface and groundwater contamination.

Risk Assessment

- The EPA has evaluated use practices, environmental fate, potential exposure routes, and toxicity of atrazine and has set a Reference Dose (RfD) for metsulfuron-methyl of 0.25 mg/kg/day. A 70 kg (154 lb) person would have an RfD of 17.5 mg/day. The RfD is the amount of daily pesticide exposure judged to pose no appreciable risk over a 70-year lifetime. The RfD for metsulfuron-methyl is based on the results of the most sensitive animal studies (rat) and includes built-in safety measures.

- EPA has determined that the expected exposure associated with metsulfuron-methyl in right-of-way use will not result in adverse health effects. However, you should take reasonable precautions to avoid exposure. Do not walk through freshly-sprayed vegetation. Do not eat berries, mushrooms, or other edibles, or drink the water from newly-treated areas. If you are concerned about exposure, consult the resources listed in **Additional Information**.

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- Wauchope, R.D., T.M. Butler, A.G. Hornsby, P.W.M. Augustijn-Beckers, and J.P. Burt. 1992. The SCS/ARS/CES Pesticide Properties Database for Environmental Decision-Making. *In* Reviews of Environmental Contamination and Toxicology. Springer-Verlag Publishers. New York.

Additional Information: Oregon

- Oregon State University Extension Environmental Chemistry and Toxicology Program
  1-541-737-5993 Extension Specialist

- Oregon Poison Control
  1-800-222-1222 (National)
  1-503-494-8968 (Portland)
  1-800-452-7165 (Outside Portland)

- Oregon Department of Agriculture
  1-503-986-4550
  1-503-986-4635 (Pesticide Division)

- Oregon Health Division Pesticide Analytical Response Center
  1-503-731-4025 (8 a.m.-5 p.m., M-F)
  1-503-731-4030 (evenings, weekends)

Washington

- Poison Control Center
  1-800-222-1222 (National)
  1-206-526-2121 (Seattle)
  1-800-732-6985 (Outside Seattle)

- Washington Department of Agriculture, Pesticide Management Division
  1-877-301-4555 (toll free)
  1-360-902-2040 (Olympia)
  1-509-576-3064 (Yakima)

- Washington State University Food and Environmental Quality Laboratory
  100 Sprout Road
  Richland, WA 99352-1643
  1-509-372-7462 (phone)
  1-509-372-7460 (fax)

- Washington Department of Health
  1-800-525-0127
  1-360-236-3360 (Pesticide Program)
  1-888-586-9427 (toll free)

Nationwide

- National Pesticide Information Center
  1-800-858-PEST (7378)
  http://npic.orst.edu/

- Extension Toxicology Network (EXTOXNET)
  http://ace.orst.edu/info/extoxnet/

- DuPont Agricultural Products
  P.O. Box 80038 Wilmington, DE 19880-0038
  1-800-441-7515
  1-800-441-3637 (emergency phone)
  1-302-992-2276 (fax)

Compiled by D. Buchwalter, J. Jenkins, N. Kerkvliet, P. Thompson 12/96
Updated by W. Trevathan 11/02

Garlon 4 Ultra

Active Ingredient

Triclopyr

Specimen Label

Dow AgroSciences™

Garlon® 4 Ultra

Specialty Herbicide

®Trademark of Dow AgroSciences LLC

For the control of woody plants and herbaceous broadleaf weeds in non-crop areas, including industrial manufacturing and storage sites, rights-of-way such as electrical power lines, communication lines, pipelines, roadsides, railroads, fence rows, non-irrigation ditch banks, forests and in the establishment and maintenance of wildlife openings. Use on these sites may include application to grazed areas.

Active Ingredient:	
triclopyr: 3,5,6-trichloro-2-pyridinyloxyacetic acid, butoxyethyl ester	60.45%
Other Ingredients	39.55%
Total	100.00%

Acid Equivalent: triclopyr - 43.46% - 4 lb/gal

Keep Out of Reach of Children

CAUTION

Agricultural Use Requirements

Use this product only in accordance with its labeling and with the Worker Protection Standard, 40 CFR Part 170. Refer to label booklet under "Agricultural Use Requirements" in the Directions for Use section for information about this standard.

Refer to inside of label booklet for additional precautionary information including Directions for Use.

Notice: Read the entire label. Use only according to label directions. **Before using this product, read Warranty Disclaimer, Inherent Risks of Use, and Limitation of Remedies at end of label booklet. If terms are unacceptable, return at once unopened.**

In case of emergency endangering health or the environment involving this product, call 1-800-992-5994.

Agricultural Chemical: Do not ship or store with food, feeds, drugs or clothing.

EPA Reg. No. 62719-527

Precautionary Statements

Hazards to Humans and Domestic Animals

CAUTION

Causes Moderate Eye Irritation • Harmful If Swallowed • Prolonged Or Frequently Repeated Skin Contact May Cause Allergic Reactions In Some Individuals

Avoid contact with skin, eyes, or clothing. Wear gloves and protective clothing. Wash thoroughly with soap and water after handling and before eating, drinking, chewing gum, or using tobacco.

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 E on an EPA chemical resistance category selections chart.

Applicators and other handlers who handle this pesticide must wear:

- Long-sleeved shirt and long pants
- Chemical-resistant gloves (≥14 mils) such as barrier laminate, nitrile rubber, neoprene rubber, or viton
- Shoes plus socks

Follow the 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.

Engineering Controls

When handlers use closed systems, enclosed cabs, or aircraft in a manner that meets the requirements listed in the Worker Protection Standard (WPS) for agricultural pesticides (40 CFR 170.240(d)(4-6)), the handler PPE requirements may be reduced or modified as specified in the WPS.

User Safety Recommendations

Users should:

- Wash hands before eating, drinking, chewing gum, using tobacco, or using the toilet.
- Remove clothing immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing.
- Remove PPE immediately after handling this product. Wash the outside of gloves before removing. As soon as possible, wash thoroughly and change into clean clothing.

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 treatment advice.

If swallowed: Call a poison control center or doctor immediately for treatment advice. Have person sip a glass of water if able to swallow. Do not induce vomiting unless told to do so by a poison control center or doctor. Do not give anything by mouth to an unconscious person.

Have the product container or label with you when calling a poison control center or doctor, or going for treatment. You may also contact 1-800-992-5994 for emergency medical treatment information.

Environmental Hazards

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

This chemical has properties and characteristics associated with chemicals detected in groundwater. The use of this chemical in areas where soils are permeable, particularly where the water table is shallow, may result in groundwater contamination.

Directions for Use

It is a violation of Federal law to use this product in a manner inconsistent with its labeling. Read all Directions for Use carefully before applying.

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 responsible for pesticide regulation.

Agricultural Use Requirements

The requirements in this box apply to forestry uses.

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 12 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
- Chemical-resistant gloves (>14 mils) such as barrier laminate, nitrile rubber, neoprene rubber, or viton
- Shoes plus socks

Non-Agricultural Use Requirements

The requirements in this box apply to all use sites on this label except for forestry uses.

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.

Entry Restrictions for Non-WPS Uses: For applications to non-cropland areas, do not allow entry into areas until sprays have dried.

Storage and Disposal

Do not contaminate water, food, or feed by storage and disposal. Open dumping is prohibited.
Pesticide Storage: Store above 28°F or agitate before use.
Pesticide Disposal: Wastes resulting from the use of this product must be disposed of on site or at an approved waste disposal facility.

Nonrefillable containers 5 gallons or less:
Container Handling: Nonrefillable container. Do not reuse or refill this container.
Triple rinse or pressure rinse container (or equivalent) promptly after emptying. **Triple rinse** as follows: Empty the remaining contents into application equipment or a mix tank and drain for 10 seconds after the flow begins to drip. Fill the container 1/4 full with water and recap. Shake for 10 seconds. Pour rinsate into application equipment or a mix tank or store rinsate for later use or disposal. Drain for 10 seconds after the flow begins to drip. Repeat this procedure two more times. **Pressure rinse** as follows: Empty the remaining contents into application equipment or a mix tank and continue to drain for 10 seconds after the flow begins to drip. Hold container upside down over application equipment or mix tank or collect rinsate for later use or disposal. Insert pressure rinsing nozzle in the side of the container, and rinse at about 40 psi for at least 30 seconds. Drain for 10 seconds after the flow begins to drip. Then offer for recycling if available or puncture and dispose of in a sanitary landfill, or by incineration, or by other procedures allowed by state and local authorities.

Refillable containers 5 gallons or larger:
Container Handling: Refillable container. Refill this container with pesticide only. Do not reuse this container for any other purpose. Cleaning the container before final disposal is the responsibility of the person disposing of the container. Cleaning before refilling is the responsibility of the refiller. To clean the container before final disposal, empty the remaining contents from this container into application equipment or a mix tank. Fill the container about 10% full with water and, if possible, spray all sides while adding water. If practical, agitate vigorously or recirculate water with the pump for two minutes. Pour or pump rinsate into application equipment or rinsate collection system. Repeat this rinsing procedure two more times. Then offer for recycling if available, or puncture and dispose of in a sanitary landfill, or by incineration, or by other procedures allowed by state and local authorities.

Nonrefillable containers 5 gallons or larger:
Container Handling: Nonrefillable container. Do not reuse or refill this container.
Triple rinse or pressure rinse container (or equivalent) promptly after emptying. **Triple rinse** as follows: Empty the remaining contents into application equipment or a mix tank. Fill the container 1/4 full with water. Replace and tighten closures. Tip container on its side and roll it back and forth, ensuring at least one complete revolution, for 30 seconds. Stand the container on its end and tip it back and forth several times. Turn the container over onto its other end and tip it back and forth several times. Empty the rinsate into application equipment or a mix tank or store rinsate for later use or disposal. Repeat this procedure two more times. **Pressure rinse** as follows: Empty the remaining contents into application equipment or a mix tank and continue to drain for 10 seconds after the flow begins to drip. Hold container upside down over application equipment or mix tank or collect rinsate for later use or disposal. Insert pressure rinsing nozzle in the side of the container, and rinse at about 40 psi for at least 30 seconds. Drain for 10 seconds after the flow begins to drip. Then offer for recycling if available, or puncture and dispose of in a sanitary landfill, or by incineration, or by other procedures allowed by state and local authorities.

General Information

Garlon® 4 Ultra specialty herbicide is recommended for the control of woody plants and herbaceous broadleaf weeds in non-crop areas, including industrial manufacturing and storage sites, rights-of-way such as electrical power lines, communication lines, pipelines, roadsides and railroads, fence rows, non-irrigation ditch banks, forests and in the establishment and maintenance of wildlife openings. Use on these sites may include application to grazed areas.

General Use Precautions and Restrictions

Chemigation: Do not apply this product through any type of irrigation system.

When applying this product in tank mix combination, follow all applicable use directions and precautions on each manufacturer's label.

Do not apply Garlon 4 Ultra directly to, or otherwise permit it to come into direct contact with cotton, grapes, peanuts, soybeans, tobacco, vegetable crops, flowers, citrus, or other desirable broadleaf plants. Do not permit spray mists containing it to drift onto such plants.

It is permissible to treat non-irrigation ditch banks, seasonally dry wetlands (such as flood plains, deltas, marshes, swamps, or bogs) and transitional areas between upland and lowland sites where surface water is not present except in isolated pockets due to uneven or unlevel conditions. Do not apply to open water (such as lakes, reservoirs, rivers, streams, creeks, salt water bays, or estuaries).

Do not apply on ditches that are used to transport irrigation water. Do not apply where runoff or irrigation water may flow onto agricultural land as injury to crops may result.

Do not apply this product using mist blowers unless a drift control additive, high viscosity inverting system, or equivalent is used to control spray drift.

Sprays applied directly to Christmas trees may result in conifer injury. When treating unwanted vegetation in Christmas tree plantations, care should be taken to direct sprays away from conifers.

Garlon 4 Ultra is formulated as a low volatile ester. However, the combination of spray contact with impervious surfaces, such as roads and rocks, and increasing ambient air temperatures, may result in an increase in the volatility potential for this herbicide, increasing a risk for off-target injury to sensitive crops such as grapes and tomatoes.

Grazing and Haying Restrictions
Except for lactating dairy animals, there are no grazing restrictions following application of this product.

- **Grazing Lactating Dairy Animals:** Do not allow lactating dairy animals to graze treated areas until the next growing season following application of this product.
- Do not harvest hay for 14 days after application.
- Portions of grazed areas that intersect treated non-cropland, rights-of-way and forestry sites may be treated at up to 8 lb ae per acre if the area to be treated on the day of application comprises no more than 10% of the total grazable area.

Slaughter Restrictions: During the season of application, withdraw livestock from grazing treated grass at least 3 days before slaughter.

Avoid Injurious Spray Drift
Make applications only when there is little or no hazard from spray drift. Small quantities of spray, which may not be visible, may seriously injure susceptible plants. Do not spray when wind is blowing toward susceptible crops or ornamental plants that are near enough to be injured. It is suggested that a continuous smoke column at or near the spray site or a smoke generator on the spray equipment be used to detect air movement, lapse conditions, or temperature inversions (stable air). If the smoke layers or indicates a potential of hazardous spray drift, do not spray.

Aerial Application (Helicopter Only): For aerial application on rights-of-way or other areas near susceptible crops, apply through a Microfoil[1] or Thru-Valve[1] boom, or use an agriculturally labeled drift control additive. Other drift reducing systems or thickened sprays prepared by using high viscosity inverting systems may be used if they are made as drift-free as mixtures containing agriculturally labeled thickening agents or applications made with the Microfoil or Thru Valve boom. Do not use a thickening agent with the Microfoil or Thru-Valve boom, or other systems that cannot accommodate thick sprays. Spray only when the wind velocity is low (follow state regulations). Avoid application during air inversions. If a spray thickening agent is used, follow all use recommendations and precautions on the product label.

[1] Reference within this label to a particular piece of equipment produced by or available from other parties is provided without consideration for use by the reader at its discretion and subject to the reader's independent circumstances, evaluation, and expertise. Such reference by Dow AgroSciences is not intended as an endorsement of such equipment, shall not constitute a warranty (express or implied) of such equipment, and is not intended to imply that other equipment is not available and equally suitable. Any discussion of methods of use of such equipment does not imply that the reader should use the equipment other than is advised in directions available from the equipment's manufacturer. The reader is responsible for exercising its own judgment and expertise, or consulting with sources other than Dow AgroSciences, in selecting and determining how to use its equipment.

Spray Drift Management
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.

The following drift management requirements must be followed to avoid off-target drift movement from aerial applications:

1. The distance of the outer most operating nozzles on the boom must not exceed 3/4 the length of the rotor.
2. Nozzles must always point backward parallel with the air stream and never be pointed downwards more than 45 degrees.

Where states have more stringent regulations, they must be observed.

The applicator should be familiar with and take into account the information covered in the following Aerial Drift Reduction Advisory. [This information is advisory in nature and does not supersede mandatory label requirements.]

Aerial Drift Reduction Advisory

Information on Droplet Size: The most effective way to reduce drift potential is to apply large droplets. The best drift management strategy is to apply the largest 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 the recommended practice. Significant deflection from 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.

Boom Length: For some use patterns, reducing the effective boom length to less than 3/4 of the wingspan or rotor length may further reduce drift without reducing swath width.

Application Height: Applications should not be made at a height greater than 10 feet above the top of the largest plants unless a greater height is required for aircraft safety. Making applications at the lowest height that is safe 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 aircraft upwind. Swath adjustment distance should increase, with increasing drift potential (higher wind, smaller drops, etc.).

Wind: Drift potential is lowest between wind speeds of 2 to 10 mph. However, many factors, including droplet size and equipment type, determine drift potential at any given speed. Application should be avoided below 2 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: Applications should not occur during a local, low level temperature inversion because drift potential is high. Temperature inversions restrict vertical air mixing, which causes small suspended droplets to remain in a concentrated cloud. This cloud 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 the 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.

Sensitive Areas: The pesticide should only be applied when the potential for drift to adjacent sensitive areas (e.g., residential areas, bodies of water, known habitat for threatened or endangered species, non-target crops) is minimal (e.g., when wind is blowing away from the sensitive areas).

Ground Equipment: To aid in reducing spray drift potential when making ground applications near susceptible crops or other desirable broadleaf plants, Garlon 4 Ultra should be used in thickened (high viscosity) spray mixtures using an agriculturally labeled drift control additive, high viscosity invert system, or equivalent as directed by the manufacturer. When using a spray thickening or inverting additive, follow all use directions and precautions on the product label. With ground equipment, spray drift can be reduced by keeping the spray boom as low as possible; by applying 20 gallons or more of spray per acre; by keeping the operating spray pressures at the lower end of the manufacturer's recommended pressures for the specific nozzle type used (low pressure nozzles are available from spray equipment manufacturers); and by spraying when wind velocity is low. Do not apply with nozzles that produce a fine droplet spray. Select nozzles and pressures which provide adequate plant coverage, but minimize the production of fine spray particles.

High Volume Leaf-Stem Treatment: To minimize spray drift, keep sprays no higher than brush tops and keep spray pressures low enough to provide coarse spray droplets. A agriculturally labeled thickening agent may be used to reduce spray drift.

Mixing Directions

Garlon 4 Ultra may be foliarly applied by diluting with water or by preparing an oil-water emulsion. For woody plant control, an oil-water emulsion performs more dependably under a broader range of conditions than a straight water dilution and is recommended for aerial applications.

Oil-Water Mixture Sprays

Prepare a premix of oil, surfactant and Garlon 4 Ultra in a separate container using diesel fuel, fuel oil, or kerosene plus an emulsifier such as Sponto 712 or Triton X-100. Use a jar test to check spray mix compatibility before preparing oil-water emulsion sprays in the mixing tank. Do not allow any water or mixtures containing water to get into the premix or Garlon 4 Ultra since a thick "invert" (water in oil) emulsion may form that will be difficult to break. Such an emulsion may also be formed if the premix of Garlon 4 Ultra is put into the mixing tank before the addition of water. Fill the spray tank about one-half full with water, then slowly add the premix with continuous agitation and complete filling the tank with water. Continue moderate agitation.

Oil Mixture Sprays for Basal Treatment

Prepare oil-based spray mixtures using either a commercially available basal oil, kerosene diesel fuel, or No. 1 or No. 2 fuel oil. Substitute other oils or diluents only as recommended by the oil or diluent's manufacturer. When mixing an oil mixture, read and follow the use directions and precautions on the manufacturer's product label. Add Garlon 4 Ultra to the required amount of oil in the spray tank or mixing tank and mix thoroughly. If the mixture stands over four hours, reagitation is required.

Oil Mixtures of Garlon 4 Ultra and Tordon K: Tordon K and Garlon 4 Ultra may be used in tank mix combination for basal bark treatment of woody plants. These herbicides are incompatible and will not form a

stable mixture when mixed together directly in oil. Make a stable tank mixture for basal bark application by first combining each product with a compatibility agent prior to final mixing in the desired ratio. (See product bulletin for mixing instructions.) Tordon K is not registered for use in the states of California and Florida.

Plants Controlled by Garlon 4 Ultra

Woody Plants Controlled

alder
madrone
arrowwood
maples
ash
mulberry
aspen
oaks
bear clover (bearmat)
persimmon
beech
pine
birch
poison ivy
blackberry
poison oak
blackgum
poplar
boxelder[1]
salmonberry
Brazilian pepper
saltbush
buckthorn
(*Braccharis* spp.)
cascara
salt cedar[1]
Ceanothus
sassafras
cherry
chinquapin
scotch broom
choke cherry
sumac
cottonwood
sweetbay magnolia
Crataegus (hawthorn)
sweetgum
dogwood
sycamore
Douglas fir
tanoak
elderberry
thimbleberry
elm
tree-of-heaven
gallberry
(*Ailanthus*)[1]
gorse
tulip poplar
hazel
wax myrtle
hickory
wild rose
hornbeam
willow
kudzu[2]
winged elm
locust

[1]For best control, use either a basal bark or cut stump treatment.
[2]For complete control, re-treatment may be necessary.

Annual and Perennial Broadleaf Weeds

black medic
matchweed
bull thistle
mustard
burdock
Oxalis
Canada thistle
plantain
chicory
purple loosestrife
clover
ragweed
creeping beggarweed
smartweed
curly dock
sweet clover
dandelion
vetch
field bindweed
wild carrot
goldenrod
(Queen Anne's lace)
ground ivy
wild lettuce
lambsquarters
wild violet
lespedeza
yarrow

Application Methods

- Apply no more than 2 lb ae of triclopyr (2 quarts of Garlon 4 Ultra) per acre per growing season on range and pasture sites, including rights-of-way, fence rows or any area where grazing or harvesting is allowed.
- On forestry sites, triclopyr may be used at rates up to 6 lb ae (6 quarts of Garlon 4 Ultra) per acre per year.
- Triclopyr may be used at rates up to 8 lb ae (8 quarts of Garlon 4 Ultra) per acre per year on non-crop areas including industrial manufacturing and storage sites, non-grazed portions of rights-of-way including electrical power lines, communication lines, pipelines, roadsides and railroads, fence rows, non-irrigation ditch banks. Portions of grazed areas that intersect treated non-cropland, rights-of-way and forestry sites may be treated at up to 8 lb ae per acre if the area to be treated on the day of application comprises no more than 10% of the total grazable area.

Use Garlon 4 Ultra at rates of 1 to 8 quarts per acre to control broadleaf weeds and woody plants. It is suggested that rates higher in this rate range be used to control woody plants. In all cases, use the amount specified in enough water to give uniform and complete coverage of the plants to be controlled. The order of addition to the spray tank is water, spray thickening agent (if used), surfactant (if used), additional herbicide (if used), and Garlon 4 Ultra. If a standard agricultural surfactant is used, use at a rate of 1 to 2 quarts per acre. Use continuous adequate agitation.

Before using any recommended tank mixtures, read the directions and all precautions on both labels.

For best results apply when woody plants and weeds are actively growing. When hard to control species such as ash, blackgum, choke cherry, elm, maples (other than vine or big leaf), oaks, pines, or winged elm are prevalent, during applications made during late summer when the plants are mature, or during drought conditions, use the higher rates of Garlon 4 Ultra alone or in combination with Tordon(r) 101 Mixture specialty herbicide or Tordon K herbicide. Tordon 101 Mixture and Tordon K are restricted use pesticides. Tordon 101 Mixture and Tordon K are not registered for use in the states of California and Florida.

When using Garlon 4 Ultra in combination with 2,4-D low volatile ester herbicide, generally the higher rates of Garlon 4 Ultra should be used for satisfactory brush control.

Use the higher dosage rates when brush approaches an average of 15 feet in height or when the brush covers more than 60% of the area to be treated. If lower rates are used on hard to control species, resprouting may occur the year following treatment.

On sites where easy to control brush species dominate, rates less than those listed may be effective. Consult state or local extension personnel for such information.

Foliage Treatment With Ground Equipment

High Volume Foliage Treatment

For control of woody plants, use Garlon 4 Ultra at the rate of 2 to 6 quarts per 100 gallons of spray mixture, or Garlon 4 Ultra at 2 to 4 quarts may be tank mixed with labeled rates of 2,4-D low volatile ester herbicide, Tordon 101 Mixture, or Tordon K and diluted to make 100 gallons of spray. Do not apply more than 2 gallons of Garlon 4 Ultra per acre. Apply at a volume of 100 to 400 gallons of total spray per acre depending upon size and density of woody plants. Tordon 101 Mixture and Tordon K are not registered for use in the states of California and Florida. When tank mixing, follow applicable use directions and precautions on each manufacturer's label.

Depending upon the size and density of the woody plants, apply sufficient spray volume to thoroughly wet all leaves, stems, and root collars. To minimize spray drift, select the minimum spray pressure that provides adequate plant coverage without forming a mist and direct sprays no higher than the top of the target plants. Use a drift control additive cleared for application to growing crops to reduce spray drift. Before using any tank mixture, read the directions and use precautions on both labels. For best results, apply when woody plants and weeds are actively growing.

Table 1: The following table is provided as a guide to the user to achieve the proper rate of Garlon 4 Ultra.

Total Spray Volume (gallons/acre)	Rate of Garlon 4 Ultra	
	Forestry Sites (qt/100 gallons of spray)[1]	Non-Cropland Sites (qt/100 gallons of spray)[2]
400	1.5	2
300	2	2.7
200	3	4
100	6	8
50	12	16
40	15	20
30	20	26.7
20	30	40
10	60	80

[1]Do not exceed the maximum use rate of 6 quarts of Garlon 4 Ultra (6 lb ae of triclopyr) per acre per year.

[2]Do not exceed the maximum use rate of 8 quarts of Garlon 4 Ultra (8 lb ae of triclopyr) per acre per year for non-grazable areas, or 2 quarts (2 lb ae of triclopyr) per acre per year for grazed areas, except on portions of grazed areas that meet the following requirement. Portions of grazed areas that intersect treated non-cropland, rights-of-way and forestry sites may be treated at up to 8 lb ae per acre if the area to be treated on the day of application comprises no more than 10% of the total grazable area.

Low Volume Foliar Treatment

To control susceptible woody plants, mix up to 5% v/v of Garlon 4 Ultra in water and apply 10 to 100 gallons of finished spray. The spray concentration of Garlon 4 Ultra and total spray volume per acre should be adjusted according to the size and density of target woody plants and kind of spray equipment used. With low volume sprays, use sufficient spray volume to obtain uniform coverage of target plants including the surfaces of all foliage, stems, and root collars (see General Use Precautions and Restrictions). For best results, a surfactant should be added to all spray mixtures. Match equipment and delivery rate of spray nozzles to height and density of woody plants. When treating tall, dense brush, a truck mounted spray gun with spray tips that deliver up to 2 gallons per minute at 40 to 60 psi may be required. Backpack or other types of specialized spray equipment with spray tips that deliver less than 1 gallon of spray per minute may be appropriate for short, low to moderate density brush.

See Table 1 for relationship between mixing rate, spray volume and maximum application rate.

Tank Mixing: As a low volume foliar spray, up to 12 quarts of Garlon 4 Ultra may be applied in tank mix combination with labeled rates of Tordon K or Tordon 101 Mixture in 10 to 100 gallons of finished spray. Tordon 101 Mixture and Tordon K are not registered for use in the states of California and Florida.

Broadcast Applications With Ground Equipment

Apply Garlon 4 Ultra using equipment that will assure thorough and uniform coverage at spray volumes applied. See Table 1 for relationship between mixing rate, spray volume and maximum application rate.

Woody Plant Control

Foliage Treatment: Use 4 to 8 quarts of Garlon 4 Ultra in enough water to make 5 gallons or more per acre of total spray, or 1 1/2 to 3 quarts of Garlon 4 Ultra may be combined with labeled rates of 2,4-D low volatile ester, Tordon 101 Mixture, or Tordon K in sufficient water to make 5 gallons or more per acre of total spray. Tordon 101 Mixture and Tordon K are not registered for use in the states of California and Florida.

Broadleaf Weed Control

Use Garlon 4 Ultra at rates of 1 to 4 quarts in a total volume of 5 gallons or more per acre as a water spray mixture. Apply anytime weeds are actively growing. Garlon 4 Ultra at 0.25 to 3 quarts may be tank mixed with labeled rates of 2,4-D amine or low volatile ester, Tordon K, or Tordon 101 Mixture to improve the spectrum of activity. For thickened (high viscosity) spray mixtures, Garlon 4 Ultra can be mixed with diesel oil or other inverting agent. When using an inverting agent, read and follow the use directions and precautions on the product label. Tordon 101 Mixture and Tordon K are not registered for use in the states of California and Florida.

Aerial Application (Helicopter Only)

Aerial sprays should be applied using suitable drift control (see General Use Precautions and Restrictions).

Foliage Treatment (Utility and Pipeline Rights-of-Way)

Use 4 to 8 quarts of Garlon 4 Ultra alone, or 3 to 4 quarts of Garlon 4 Ultra in a tank mix combination with labeled rates of 2,4-D low volatile ester, Tordon 101 Mixture or Tordon K and apply in a total spray volume of 10 to 30 gallons per acre. Use the higher rates and volumes when plants are dense or under drought conditions. Tordon 101 Mixture and Tordon K are not registered for use in the states of California and Florida.

Portions of grazed areas that intersect treated non-cropland, rights-of-way and forestry sites may be treated at up to 8 lb ae per acre if the area to be treated on the day of application comprises no more than 10% of the total grazable area.

Basal Bark, Dormant Stem and Cut Surface Treatments

Individual plant treatments such as basal bark and cut surface applications may be used on any use site listed on this label at a maximum use rate of 8 quarts of Garlon 4 Ultra (8 lb ae of triclopyr) per acre. These types of applications are made directly to ungrazed parts of plants and, therefore, are not restricted by the grazing maximum rate of 2 quarts of Garlon 4 Ultra (2 lb ae of triclopyr) per acre.

Basal Bark Treatment

To control susceptible woody plants with stems less than 6 inches in basal diameter, mix 1 to 5 gallons of Garlon 4 Ultra in enough oil to make 100 gallons of spray mixture. Apply with knapsack sprayer or power spraying equipment using low pressure (20 to 40 psi). Spray the basal parts of brush and tree trunks to a height of 12 to 15 inches from the ground, thoroughly wetting the indicated area. Spray until runoff at the ground line is noticeable. Old or rough bark requires more spray than smooth young bark. Apply anytime, including the winter months, except when snow or water prevent spraying to the ground line. **Mixing with oil requires vigorous agitation to form an oil solution**. Once a solution is formed it will stay stable.

Low Volume Basal Bark Treatment
To control susceptible woody plants with stems less than 6 inches in basal diameter, mix 20 to 30 gallons of Garlon 4 Ultra in enough oil to make 100 gallons of spray mixture. Apply with a backpack or knapsack sprayer using low pressure and a solid cone or flat fan nozzle. Spray the basal parts of brush and tree trunks to a height of 12 to 15 inches from the ground in a manner that thoroughly wets the lower stems, including the root collar area, but not to the point of runoff. Herbicide concentration should vary with size and susceptibility of species treated. Apply anytime, including the winter months, except when snow or water prevent spraying to the ground line or when stem surfaces are saturated with water. See Table 1 for relationship between mixing rate, spray volume and maximum application rate. **Mixing with oil requires vigorous agitation to form an oil solution**. Once a solution is formed it will stay stable.

Garlon 4 Ultra Plus Tordon K in Oil Tank Mix: Garlon 4 Ultra and Tordon K may be used in tank mix combination as a low volume basal bark treatment to improve control of certain woody species such as ash, elm, maple, poplar, aspen, hackberry, oak, oceanspray, birch, hickory, pine, tanoak, cherry, locust, sassafras, and multiflora rose. (See product bulletin for mixing instructions.) Tordon K is not registered for use in the states of California and Florida.

Streamline Basal Bark Treatment (Southern States)
To control or suppress susceptible woody plants for conifer release, mix 20 to 30 gallons of Garlon 4 Ultra in enough oil to make 100 gallons of spray mixture. Streamline basal bark treatments are most effective on stems less than 4 inches in basal diameter. Apply with a backpack or knapsack sprayer using equipment that provides a directed straight stream spray. Apply the spray in a 2- to 3-inch wide band to one side of stems less than 3 inches in basal diameter. When the optimum amount of spray mixture is applied, the treated zone should widen to encircle the stem within approximately 30 minutes. Treat both sides of stems which are 3 to 4 inches in basal diameter. Direct the spray at bark that is approximately 12 to 24 inches above ground. Pines (loblolly, slash, shortleaf, and Virginia) up to 2 inches in diameter breast height (dbh) can be controlled by directing the spray at a point approximately 4 feet above ground. Vary spray mixture concentration with size and susceptibility of the species being treated. Better control is achieved when spray is applied to thin juvenile bark and above rough thickened mature bark. This technique is not recommended for scrub and live oak species, including blackjack, turkey, post, live, bluejack and laurel oaks, or bigleaf maple. Apply anytime, including winter months, except when snow or water prevents spraying at the desired height above ground level. **Note:** Best results with some hardwood species occur when applications are made from approximately 6 weeks prior to leaf expansion in the spring until approximately 2 months after leaf expansion is completed. **Mixing with oil requires vigorous agitation to form an oil solution.** Once a solution is formed it will stay stable.

Low Volume Stem Bark Band Treatment (North Central and Lake States)
To control susceptible woody plants with stems less than 6 inches in basal diameter, mix 20 to 30 gallons of Garlon 4 Ultra in enough oil to make 100 gallons of spray mixture. Apply with a backpack or knapsack sprayer using low pressure and a solid cone or flat fan nozzle. Apply the spray in a 6- to 10-inch wide band that completely encircles the stem. Spray in a manner that completely wets the bark, but not to the point of runoff. The treatment band may be positioned at any height up to the first major branch. For best results apply the band as low as possible. Spray mixture concentration should vary with size and susceptibility of species to be treated. Applications may be made anytime, including winter months. **Mixing with oil requires vigorous agitation to form an oil solution.** Once a solution is formed it will stay stable.

Thinline Basal Bark Treatment
To control susceptible woody plants with stems less than 6 inches in diameter, apply Garlon 4 Ultra, either undiluted or mixed at 50 to 75% v/v with oil, in a thin stream to all sides of the lower stems. The stream should be directed horizontally to apply a narrow band of Garlon 4 Ultra around each stem or clump. Use a minimum of 2 to 15 milliliters of Garlon 4 Ultra or oil mixture with Garlon 4 Ultra to treat single stems and from 25 to 100 milliliters to treat clumps of stems. Use an applicator metered or calibrated to deliver the small amounts required. **Mixing with oil requires vigorous agitation to form an oil solution.** Once a solution is formed it will stay stable.

Dormant Stem Treatment
Dormant stem treatments will control susceptible woody plants and vines with stems less than 2 inches in diameter. Plants with stems greater than 2 inches in diameter may not be controlled and resprouting may occur. This treatment method is best suited for sites with dense, small diameter brush. Dormant stem treatments of Garlon 4 Ultra can also be used as a chemical side-trim for controlling lateral branches of larger trees that encroach onto roadside, utility, or other rights-of-way.

Mix 4 to 8 quarts of Garlon 4 Ultra in 2 to 3 gallons of crop oil concentrate or other recommended oil and add this mixture to enough water to make 100 gallons of spray solution. Use continuous adequate agitation. Apply with knapsack or power spraying equipment, using low pressure (20 to 40 psi). In western states, apply anytime after woody plants are dormant and most of the foliage has dropped. In other areas apply anytime within 10 weeks of budbreak, generally February through April. Garlon 4 Ultra may be mixed with 4 quarts of Weedone 170 herbicide to improve the control of black cherry and broaden the spectrum of herbicidal activity. Do not apply to wet or saturated bark as poor control may result.

Cut Stump Treatment
To control resprouting, mix 20 to 30 gallons of Garlon 4 Ultra in enough oil to make 100 gallons of spray mixture. Apply with a backpack or knapsack sprayer using low pressures and a solid cone or flat fan nozzle. Spray the root collar area, sides of the stump, and the outer portion of the cut surface, including the cambium, until thoroughly wet, but not to the point of runoff. Spray mixture concentration should vary with size and susceptibility of species treated. Apply anytime, including in winter months, except when snow or water prevent spraying to the ground line. **Mixing with oil requires vigorous agitation to form an oil solution.** Once a solution is formed it will stay stable.

Cut Stump Treatment in Western States
To control resprouting of salt cedar and other Tamarix species, bigleaf maple, tanoak, Oregon myrtle, and other susceptible species, apply undiluted Garlon 4 Ultra to wet the cambium and adjacent wood around the entire circumference of the cut stump. Treatments may be applied throughout the year; however, control may be reduced with treatment during periods of moisture stress as in late summer. Cut stumps so that they are approximately level to facilitate uniform coverage of Garlon 4 Ultra. Use an applicator that can be calibrated to deliver the small amounts of material required.

Forest Management Applications

For broadcast applications, apply 1 to 6 quarts of Garlon 4 Ultra per acre in a total spray volume of 5 to 25 gallons per acre by air or 10 to 100 gallons per acre by ground. Use spray volumes sufficient to provide thorough coverage of treated foliage. Nozzles or additives that produce larger droplets of spray may require higher spray volumes to provide adequate coverage.

Plant Back Interval for Conifers: Conifers planted sooner than one month after treatment with Garlon 4 Ultra at less than 4 quarts per acre or sooner than two months after treatment at 4 to 6 quarts per acre may be injured. When tank mixtures of herbicides are used for forest site preparation, labels for all products in the mixture should be consulted and the longest recommended waiting period observed.

Forest Site Preparation (Not For Conifer Release)

Southern States Including Alabama, Arkansas, Delaware, Florida, Georgia, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, and Virginia: To control susceptible woody plants and broadleaf weeds, apply Garlon 4 Ultra at a rate of 4 to 6 quarts per acre. To broaden the spectrum of woody plants and broadleaf weeds controlled, apply 2 to 4 quarts of Garlon 4 Ultra per acre in tank mix combination with labeled rates of Tordon 101 Mixture or Tordon K. Tordon 101 Mixture and Tordon K are not registered for use in the state of Florida. Where grass control is also desired, Garlon 4 Ultra, alone or in combination with Tordon K or Tordon 101 Mixture, may be applied with labeled rates of other herbicides registered for grass control in forests. Use of tank mix products must be in accordance with the most restrictive of label limitations and precautions. Do not exceed labeled application rates. Garlon 4 Ultra cannot be tank mixed with any product containing a label prohibition against such mixing.

In Western, Northeastern, North Central, and Lake States (States Not Listed Above as Southern States): To control susceptible woody plants and broadleaf weeds, apply Garlon 4 Ultra at a rate of 3 to 6 quarts per acre. To broaden the spectrum of woody plants and broadleaf weeds controlled, apply 1.5 to 3 quarts per acre of Garlon 4 Ultra in tank mix combination with labeled rates of Tordon 101 Mixture, Tordon K, or 2,4-D low volatile ester. Tordon 101 Mixture and Tordon K are not registered for use in the state of California. Where grass control is also desired, Garlon 4 Ultra, alone or in tank mix combination with Tordon 101 Mixture or Tordon K, may be applied with labeled rates of other herbicides registered for grass control in forests. When applying tank mixes, follow applicable use directions and precautions on each product label.

Southern Coastal Flatwoods: To control susceptible broadleaf weeds and woody species such as gallberry and wax-myrtle, and for partial control of saw-palmetto, apply 2 to 4 quarts of Garlon 4 Ultra per acre. To broaden the spectrum of species controlled to include fetterbush, staggerbush, titi, and grasses, apply 2 to 3 quarts per acre of Garlon 4 Ultra in tank mix combination with labeled rates of Arsenal Applicator's Concentrate herbicide. Where control of gallberry, wax-myrtle, broadleaf weeds, and grasses is desired, apply 2 to 3 quarts of Garlon 4 Ultra per acre in tank mix combination with labeled rates of Accord Concentrate or Accord SP herbicide.

These treatments may be broadcast during site preparation of flat planted or bedded sites or, on bedded sites, applied in bands over the top of beds. For best results, apply in late summer or fall. Efficacy may not be satisfactory when applications are made in early season prior to August. **Note:** Do not apply after planting pines.

Directed Sprays Applications for Conifer Release
To release conifers from competing hardwoods and brush such as red maple, sugar maple, striped maple, sweetgum, red and white oaks, ash, hickory, alder, birch, aspen, pin cherry, Ceanothus spp., blackberry, chinquapin, and poison oak, mix 4 to 20 quarts of Garlon 4 Ultra in enough water to make 100 gallons of spray mixture. This spray mixture should be directed onto foliage of competitive hardwoods using knapsack or backpack sprayers with flat fan nozzles or equivalent anytime after the hardwoods and brush have reached full leaf size, but before autumn coloration. The majority of treated hardwoods and brush should be less than 6 feet in height to ensure adequate spray coverage. Care should be taken to direct spray solutions away from contact with conifer foliage, particularly foliage of desirable pines. See Table 1 for relationship between mixing rate, spray volume and maximum application rate.

Note: Spray may cause temporary damage and growth suppression where contact with conifers occurs; however, injured conifers should recover and grow normally. Over-the-top spray applications can kill pines.

Broadcast Applications for Mid-Rotation Understory Brush Control in Southern Coastal Flatwoods Pine Stands (Ground Equipment Only)
For control of susceptible species, such as gallberry and wax-myrtle, and broadleaf weeds, apply 2 to 4 quarts of Garlon 4 Ultra per acre. To broaden the spectrum of woody plants controlled to include fetterbush, staggerbush, and titi, apply 2 to 3 quarts of Garlon 4 Ultra per acre in tank mix combination with labeled rates of Arsenal Applicator's Concentrate. Saw-palmetto will be partially controlled by use of Garlon 4 Ultra at 4 quarts per acre or by mixtures of Garlon 4 Ultra at 2 to 3 quarts per acre in tank mix combination with either Arsenal Applicator's Concentrate or Escort herbicide. These mixtures should be broadcast applied over target understory brush species, **but to prevent injury to pines, make applications underneath the foliage of pines.** Apply sprays in 30 gallons or more per acre of total volume. For best results, apply in late summer or fall. Efficacy may not be satisfactory when applications are made in early season prior to August.

Broadcast Applications for Conifer Release in the Pacific Northwest and California

Dormant Conifers Before Bud Swell (Excluding Pines): To control or suppress deciduous hardwoods such as vine maple, bigleaf maple, alder, scotch broom, or willow **before leaf-out**, or evergreen hardwoods such as madrone, chinquapin, and *Ceanothus* spp., use Garlon 4 Ultra at 1 to 2 quarts per acre. Use diesel or fuel oil as a diluent, or use water plus 1 to 2 gallons per acre of diesel oil or a suitable surfactant or oil substitute at manufacturer's recommended rates. **Mixing with oil as the only diluent requires vigorous agitation to form an oil solution.** Once a solution is formed it will stay stable.

Conifer Plantations (Excluding Pines) After Hardwoods Begin Growth and Before Conifer Bud Break ("Early Foliar" Hardwood Stage):
Use Garlon 4 Ultra at 1 to 1.5 quarts alone or with 2,4-D low volatile ester herbicide in water carrier to provide no more than 3 lb ae per acre from both products. After conifer bud break, these sprays may cause more serious injury to the crop trees. Use of a surfactant may cause unacceptable injury to conifers especially after bud break.

Conifer Plantations (Excluding Pines) After Conifers Harden Off In Late Summer and While Hardwoods Are Still Growing Actively: Use Garlon 4 Ultra at rates of 1 to 1.5 quarts per acre alone or with 2,4-D low volatile ester to provide no more than 3 lb ae per acre from both products. Treat as soon after conifer bud hardening as possible so that hardwoods and brush are actively growing. Use of oil, oil substitute, or surfactant may cause unacceptable injury to the conifers.

Broadcast Applications for Conifer Release in the Eastern United States
To release spruce, fir, red pine, and white pine from competing hardwoods such as red maple, sugar maple, striped maple, alder, birch (white, yellow, and grey), aspen, ash, pin cherry, and *Rubus* spp. and perennial and annual broadleaf weeds, use Garlon 4 Ultra at rates of 1.5 to 3 quarts per acre alone or with 2,4-D amine or low volatile ester to provide no more than 4 lb ae per acre from both products. Apply in late summer or early fall after conifers have formed their overwintering buds and hardwoods are in full leaf and prior to autumn coloration.

Broadcast Applications for Conifer Release in the Lake States Region

To release spruce, fir, and red pine from competing hardwoods such as aspen, birch, maple, cherry, willow, oak, hazel, and Rubus spp. and perennial and annual broadleaf weeds, use Garlon 4 Ultra at rates of 1.5 to 3 quarts per acre. Apply in late summer or early fall after conifers have formed their overwintering buds and hardwoods are in full leaf and prior to autumn coloration.

Terms and Conditions of Use

If terms of the following Warranty Disclaimer, Inherent Risks of Use, and Limitation of Remedies are not acceptable, return unopened package at once to the seller for a full refund of purchase price paid. Otherwise, use by the buyer or any other user constitutes acceptance of the terms under Warranty Disclaimer, Inherent Risks of Use and Limitation of Remedies.

Warranty Disclaimer

Dow AgroSciences warrants that this product conforms to the chemical description on the label and is reasonably fit for the purposes stated on the label when used in strict accordance with the directions, subject to the inherent risks set forth below. Dow AgroSciences MAKES NO OTHER EXPRESS OR IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR ANY OTHER EXPRESS OR IMPLIED WARRANTY.

Inherent Risks of Use

It is impossible to eliminate all risks associated with use of this product. Plant injury, lack of performance, or other unintended consequences may result because of such factors as use of the product contrary to label instructions (including conditions noted on the label, such as unfavorable temperature, soil conditions, etc.), abnormal conditions (such as excessive rainfall, drought, tornadoes, hurricanes), presence of other materials, the manner of application, or other factors, all of which are beyond the control of Dow AgroSciences or the seller. To the extent permitted by law, all such risks shall be assumed by buyer.

Limitation of Remedies

To the extent permitted by law, the exclusive remedy for losses or damages resulting from this product (including claims based on contract, negligence, strict liability, or other legal theories), shall be limited to, at Dow AgroSciences' election, one of the following:

1. Refund of purchase price paid by buyer or user for product bought, or
2. Replacement of amount of product used.

To the extent permitted by law, Dow AgroSciences shall not be liable for losses or damages resulting from handling or use of this product unless Dow AgroSciences is promptly notified of such loss or damage in writing. To the extent permitted by law, in no case shall Dow AgroSciences be liable for consequential or incidental damages or losses.

The terms of the Warranty Disclaimer, Inherent Risks of Use and this Limitation of Remedies cannot be varied by any written or verbal statements or agreements. No employee or sales agent of Dow AgroSciences or the seller is authorized to vary or exceed the terms of the Warranty Disclaimer or this Limitation of Remedies in any manner.

Label Code: D02-329-004
Replaces Label: D02-329-003
LOES Number: 010-02127

EPA accepted 11/13/08

Revisions:

1. Added Mixing Directions section.
2. Added additional directions for high volume foliage treatment.
3. Added stem and cut surface treatments.

Dow AgroSciences LLC encourages and expects you to read and understand the entire (M)SDS, as there is important information throughout the document. We expect you to follow the precautions identified in this document unless your use conditions would necessitate other appropriate methods or actions.

1. Product and Company Identification

Product Name
GARLON* 4 Ultra Herbicide

COMPANY IDENTIFICATION
Dow AgroSciences LLC
A Subsidiary of The Dow Chemical Company
9330 Zionsville Road
Indianapolis, IN 46268-1189
USA

Customer Information Number: 800-992-5994
SDSQuestion@dow.com

EMERGENCY TELEPHONE NUMBER

24-Hour Emergency Contact: 800-992-5994
Local Emergency Contact: 352-323-3500

2. Hazards Identification

Emergency Overview
Color: Yellow
Physical State: Liquid.
Odor: Mild
Hazards of product:

WARNING! May cause allergic skin reaction. May cause eye irritation. May cause skin irritation. May be harmful if swallowed. Isolate area. Toxic fumes may be released in fire situations.

OSHA Hazard Communication Standard
This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

Potential Health Effects
Eye Contact: May cause slight eye irritation. Corneal injury is unlikely.
Skin Contact: Brief contact may cause moderate skin irritation with local redness. May cause drying and flaking of the skin.

Skin Absorption: Prolonged skin contact is unlikely to result in absorption of harmful amounts.
Skin Sensitization: Prolonged or frequently repeated skin contact may cause allergic skin reactions in some individuals. Has demonstrated the potential for contact allergy in mice.
Inhalation: Prolonged exposure is not expected to cause adverse effects.
Ingestion: Low toxicity if swallowed. Small amounts swallowed incidentally as a result of normal handling operations are not likely to cause injury; however, swallowing larger amounts may cause injury.
Effects of Repeated Exposure: For the active ingredient(s): In animals, effects have been reported on the following organs: Blood. Kidney. Liver.
Cancer Information: In long-term animal studies with ethylene glycol butyl ether, small but statistically significant increases in tumors were observed in mice but not rats. The effects are not believed to be relevant to humans. If the material is handled in accordance with proper industrial handling procedures, exposures should not pose a carcinogenic risk to man.
Birth Defects/Developmental Effects: For the active ingredient(s): Has been toxic to the fetus in laboratory animals at doses toxic to the mother.
Reproductive Effects: The data presented are for the following material: Triclopyr. In laboratory animal studies, effects on reproduction have been seen only at doses that produced significant toxicity to the parent animals.

3. Composition Information

Component	CAS #	Amount
Triclopyr-2-butoxyethyl ester	64700-56-7	60.5 %
Ethylene glycol monobutyl ether	111-76-2	0.5 %
Balance	Not available	39.0 %

4. First-aid measures

Description of first aid measures

Inhalation: Move person to fresh air. If person is not breathing, call an emergency responder or ambulance, then give artificial respiration; if by mouth to mouth use rescuer protection (pocket mask etc). Call a poison control center or doctor for treatment advice.
Skin Contact: 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.
Eye Contact: Hold eyes 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 eyes. Call a poison control center or doctor for treatment advice.
Ingestion: Call a poison control center or doctor immediately for treatment advice. Have person sip a glass of water if able to swallow. Do not induce vomiting unless told to do so by the poison control center or doctor. Never give anything by mouth to an unconscious person.

Most important symptoms and effects, both acute and delayed

Aside from the information found under Description of first aid measures (above) and Indication of immediate medical attention and special treatment needed (below), no additional symptoms and effects are anticipated.

Indication of immediate medical attention and special treatment needed

No specific antidote. Treatment of exposure should be directed at the control of symptoms and the clinical condition of the patient. Have the Safety Data Sheet, and if available, the product container or label with you when calling a poison control center or doctor, or going for treatment.

5. Fire Fighting Measures

Suitable extinguishing media

Water fog or fine spray. Dry chemical fire extinguishers. Carbon dioxide fire extinguishers. Foam. Alcohol resistant foams (ATC type) are preferred. General purpose synthetic foams (including AFFF) or protein foams may function, but will be less effective. Water fog, applied gently may be used as a blanket for fire extinguishment.
Extinguishing Media to Avoid: Do not use direct water stream. May spread fire.

Special hazards arising from the substance or mixture

Hazardous Combustion Products: During a fire, smoke may contain the original material in addition to combustion products of varying composition which may be toxic and/or irritating. Combustion products may include and are not limited to: Nitrogen oxides. Hydrogen chloride. Carbon monoxide. Carbon dioxide. Phosgene.
Unusual Fire and Explosion Hazards: Container may rupture from gas generation in a fire situation. Violent steam generation or eruption may occur upon application of direct water stream to hot liquids.

Advice for firefighters

Fire Fighting Procedures: Keep people away. Isolate fire and deny unnecessary entry. Use water spray to cool fire exposed containers and fire affected zone until fire is out and danger of reignition has passed. Fight fire from protected location or safe distance. Consider the use of unmanned hose holders or monitor nozzles. Immediately withdraw all personnel from the area in case of rising sound from venting safety device or discoloration of the container. Do not use direct water stream. May spread fire. Move container from fire area if this is possible without hazard. Burning liquids may be moved by flushing with water to protect personnel and minimize property damage. Water fog, applied gently may be used as a blanket for fire extinguishment. Contain fire water run-off if possible. Fire water run-off, if not contained, may cause environmental damage. Review the “Accidental Release Measures” and the “Ecological Information” sections of this (M)SDS.
Special Protective Equipment for Firefighters: Wear positive-pressure self-contained breathing apparatus (SCBA) and protective fire fighting clothing (includes fire fighting helmet, coat, trousers, boots, and gloves). Avoid contact with this material during fire fighting operations. If contact is likely, change to full chemical resistant fire fighting clothing with self-contained breathing apparatus. If this is not available, wear full chemical resistant clothing with self-contained breathing apparatus and fight fire from a remote location. For protective equipment in post-fire or non-fire clean-up situations, refer to the relevant sections.

6. Accidental Release Measures

Personal precautions, protective equipment and emergency procedures: Isolate area. Keep unnecessary and unprotected personnel from entering the area. Refer to Section 7, Handling, for additional precautionary measures. Use appropriate safety equipment. For additional information, refer to Section 8, Exposure Controls and Personal Protection.

Environmental precautions: Prevent from entering into soil, ditches, sewers, waterways and/or groundwater. See Section 12, Ecological Information.
Methods and materials for containment and cleaning up: Contain spilled material if possible. Small spills: Absorb with materials such as: Clay. Dirt. Sand. Sweep up. Collect in suitable and properly labeled containers. Large spills: Contact Dow AgroSciences for clean-up assistance. See Section 13, Disposal Considerations, for additional information.

7. Handling and Storage

Handling

General Handling: Keep out of reach of children. Do not swallow. Avoid breathing vapor or mist. Avoid contact with eyes, skin, and clothing. Use with adequate ventilation. Wash thoroughly after handling. See Section 8, EXPOSURE CONTROLS AND PERSONAL PROTECTION.

Storage

Store in a dry place. Store in original container. Keep container tightly closed when not in use. Do not store near food, foodstuffs, drugs or potable water supplies.

8. Exposure Controls / Personal Protection

Exposure Limits

Component	List	Type	Value
Triclopyr-2-butoxyethyl ester	Dow IHG	TWA	2 mg/m3 D-SEN

RECOMMENDATIONS IN THIS SECTION ARE FOR MANUFACTURING, COMMERCIAL BLENDING AND PACKAGING WORKERS. APPLICATORS AND HANDLERS SHOULD SEE THE PRODUCT LABEL FOR PROPER PERSONAL PROTECTIVE EQUIPMENT AND CLOTHING.
A D-SEN notation following the exposure guideline refers to the potential to produce dermal sensitization, as confirmed by human or animal data.

Personal Protection

Eye/Face Protection: Use safety glasses (with side shields).
Skin Protection: Use protective clothing chemically resistant to this material. Selection of specific items such as face shield, boots, apron, or full body suit will depend on the task. Remove contaminated clothing immediately, wash skin area with soap and water, and launder clothing before reuse or dispose of properly. Items which cannot be decontaminated, such as shoes, belts and watchbands, should be removed and disposed of properly.

Hand protection: Use gloves chemically resistant to this material. Examples of preferred glove barrier materials include: Butyl rubber. Chlorinated polyethylene. Neoprene. Polyethylene. Ethyl vinyl alcohol laminate ("EVAL"). Examples of acceptable glove barrier materials include: Natural rubber ("latex"). Viton. Polyvinyl chloride ("PVC" or "vinyl"). Nitrile/butadiene rubber ("nitrile" or "NBR"). NOTICE: The selection of a specific glove for a particular application and duration of use in a workplace should also take into account all relevant workplace factors such as, but not limited to: Other chemicals which may be handled, physical requirements (cut/puncture protection, dexterity, thermal protection), potential body reactions to glove materials, as well as the instructions/specifications provided by the glove supplier.

Respiratory Protection: Respiratory protection should be worn when there is a potential to exceed the exposure limit requirements or guidelines. If there are no applicable exposure limit requirements or guidelines, wear respiratory protection when adverse effects, such as respiratory irritation or discomfort have been experienced, or where indicated by your risk assessment process. For most conditions no respiratory protection should be needed; however, if discomfort is experienced, use an approved air-purifying respirator. The following should be effective types of air-purifying respirators: Organic vapor cartridge with a particulate pre-filter.
Ingestion: Use good personal hygiene. Do not consume or store food in the work area. Wash hands before smoking or eating.

Engineering Controls

Ventilation: Use local exhaust ventilation, or other engineering controls to maintain airborne levels below exposure limit requirements or guidelines. If there are no applicable exposure limit requirements or guidelines, general ventilation should be sufficient for most operations.

9. Physical and Chemical Properties

Appearance	
Physical State	Liquid.
Color	Yellow
Odor	Mild
pH	3.36 (@ 1 %) *pH Electrode* (1% aqueous suspension)
Melting Point	Not applicable
Freezing Point	No test data available
Boiling Point (760 mmHg)	No test data available.
Flash Point - Closed Cup	> 100 °C (> 212 °F) *Pensky-Martens Closed Cup ASTM D 93*
Evaporation Rate (Butyl Acetate = 1)	No test data available
Flammable Limits In Air	**Lower**: No test data available **Upper**: No test data available

Vapor Pressure	No test data available
Vapor Density (air = 1)	No test data available
Specific Gravity (H2O = 1)	1.11 *Digital Density Meter (Oscillating Coil)*
Solubility in water (by weight)	emulsifies
Partition coefficient, n-octanol/water (log Pow)	No data available for this product.
Autoignition Temperature	> 325 °C (> 617 °F) *Literature*
Decomposition Temperature	No test data available
Dynamic Viscosity	23.4 mPa.s @ 20 °C
Kinematic Viscosity	No test data available
Liquid Density	1.11 g/cm3 @ 20 °C *Digital density meter*

10. Stability and Reactivity

Reactivity
No dangerous reaction known under conditions of normal use.
Chemical stability
Thermally stable at typical use temperatures.

Possibility of hazardous reactions
Polymerization will not occur.
Conditions to Avoid: Exposure to elevated temperatures can cause product to decompose. Generation of gas during decomposition can cause pressure in closed systems.

Incompatible Materials: Avoid contact with: Strong acids. Strong bases. Strong oxidizers.
Hazardous decomposition products
Decomposition products depend upon temperature, air supply and the presence of other materials. Decomposition products can include and are not limited to: Hydrogen chloride. Nitrogen oxides. Phosgene.

11. Toxicological Information

Acute Toxicity
Ingestion
LD50, Rat, female 3,200 mg/kg
Dermal
LD50, Rat, male and female > 5,000 mg/kg
Inhalation
LC50, 4 h, Aerosol, Rat, male and female > 5.05 mg/l
Eye damage/eye irritation
May cause slight eye irritation. Corneal injury is unlikely.
Skin corrosion/irritation
Brief contact may cause moderate skin irritation with local redness. May cause drying and flaking of the skin.
Sensitization
Skin
Prolonged or frequently repeated skin contact may cause allergic skin reactions in some individuals. Has demonstrated the potential for contact allergy in mice.
Repeated Dose Toxicity
For the active ingredient(s): In animals, effects have been reported on the following organs: Blood. Kidney. Liver.
Chronic Toxicity and Carcinogenicity
In long-term animal studies with ethylene glycol butyl ether, small but statistically significant increases in tumors were observed in mice but not rats. The effects are not believed to be relevant to humans.

If the material is handled in accordance with proper industrial handling procedures, exposures should not pose a carcinogenic risk to man. The data presented are for the following material: Triclopyr. Did not cause cancer in laboratory animals.

Carcinogenicity Classifications:

Component	List	Classification
Ethylene glycol monobutyl ether	ACGIH	Confirmed animal carcinogen with unknown relevance to humans.; Group A3

Developmental Toxicity

For the active ingredient(s): Has been toxic to the fetus in laboratory animals at doses toxic to the mother. For the active ingredient(s): Did not cause birth defects in laboratory animals.

Reproductive Toxicity

The data presented are for the following material: Triclopyr. In laboratory animal studies, effects on reproduction have been seen only at doses that produced significant toxicity to the parent animals. The data presented are for the following material: Butoxyethanol. In animal studies, did not interfere with reproduction. For the minor component(s): Available data are inadequate to determine effects on reproduction.

Genetic Toxicology

For the active ingredient(s): In vitro genetic toxicity studies were negative. For the active ingredient(s): Animal genetic toxicity studies were negative.

12. Ecological Information

Toxicity

Based largely or completely on information for similar material(s). Material is highly toxic to aquatic organisms on an acute basis (LC50/EC50 between 0.1 and 1 mg/L in the most sensitive species tested). Material is slightly toxic to birds on an acute basis (LD50 between 501 and 2000 mg/kg).

Fish Acute & Prolonged Toxicity

For similar material(s): LC50, bluegill (Lepomis macrochirus), 96 h: 0.44 - 1.2 mg/l
LC50, rainbow trout (Oncorhynchus mykiss), 96 h: 0.98 - 2.6 mg/l
LC50, Atlantic silverside (Menidia menidia), 96 h: 0.77 mg/l

Aquatic Invertebrate Acute Toxicity

For similar material(s): EC50, water flea Daphnia magna, 48 h, immobilization: 0.35 - 2.0 mg/l
EC50, eastern oyster (Crassostrea virginica), 96 h, shell growth inhibition: 0.30 mg/l
LC50, grass shrimp (Palaemonetes pugio), 96 h, lethality: > 1.8 mg/l
LC50, water flea Daphnia magna, 48 h, lethality: 0.43 mg/l

Aquatic Plant Toxicity

For similar material(s): EbC50, green alga Pseudokirchneriella subcapitata (formerly known as Selenastrum capricornutum), biomass growth inhibition, 72 h: 11 mg/l

Toxicity to Above Ground Organisms

Based on information for a similar material: oral LD50, bobwhite (Colinus virginianus): 1,350 mg/kg

Persistence and Degradability

For similar material(s): Biodegradation under aerobic static laboratory conditions is moderate (BOD20 or BOD28/ThOD between 10 and 40%).

Biological oxygen demand (BOD): For similar material(s):

BOD 5	BOD 10	BOD 20	BOD 28
26 %	36 %		48 %

Bioaccumulative potential

Bioaccumulation: For the active ingredient(s): Bioconcentration potential is low (BCF < 100 or Log Pow < 3).

Mobility in soil

Mobility in soil: For the active ingredient(s):, Potential for mobility in soil is low (Koc between 500 and 2000).

13. Disposal Considerations

If wastes and/or containers cannot be disposed of according to the product label directions, disposal of this material must be in accordance with your local or area regulatory authorities. This information presented below only applies to the material as supplied. The identification based on characteristic(s) or listing may not apply if the material has been used or otherwise contaminated. It is the responsibility of the waste generator to determine the toxicity and physical properties of the material generated to determine the proper waste identification and disposal methods in compliance with applicable regulations. If the material as supplied becomes a waste, follow all applicable regional, national and local laws.

14. Transport Information

DOT Non-Bulk
NOT REGULATED

DOT Bulk
NOT REGULATED

IMDG
Proper Shipping Name: ENVIRONMENTALLY HAZARDOUS SUBSTANCES, LIQUID, N.O.S
Technical Name: Contains Triclopyr-2-butoxyethyl Ester
Hazard Class: 9 **ID Number:** UN3082 **Packing Group:** PG III
EMS Number: f-a,s-f
Marine pollutant.: Yes

ICAO/IATA
Proper Shipping Name: ENVIRONMENTALLY HAZARDOUS SUBSTANCES, LIQUID, N.O.S
Technical Name: Contains Triclopyr-2-butoxyethyl Ester
Hazard Class: 9 **ID Number:** UN3082 **Packing Group:** PG III
Cargo Packing Instruction: 964
Passenger Packing Instruction: 964
Additional Information

MARINE POLLUTANT
Contains Triclopyr-2-butoxyethyl Ester

This information is not intended to convey all specific regulatory or operational requirements/information relating to this product. Additional transportation system information can be obtained through an authorized sales or customer service representative. It is the responsibility of the transporting organization to follow all applicable laws, regulations and rules relating to the transportation of the material.

15. Regulatory Information

OSHA Hazard Communication Standard
This product is a “Hazardous Chemical” as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

Superfund Amendments and Reauthorization Act of 1986 Title III (Emergency Planning and Community Right-to-Know Act of 1986) Sections 311 and 312

Immediate (Acute) Health Hazard	Yes
Delayed (Chronic) Health Hazard	Yes
Fire Hazard	No

Reactive Hazard No
Sudden Release of Pressure Hazard No

Superfund Amendments and Reauthorization Act of 1986 Title III (Emergency Planning and Community Right-to-Know Act of 1986) Section 313
This product contains the following substances which are subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and which are listed in 40 CFR 372.

Component	CAS #	Amount
Triclopyr-2-butoxyethyl ester	64700-56-7	60.5%

Pennsylvania (Worker and Community Right-To-Know Act): Pennsylvania Hazardous Substances List and/or Pennsylvania Environmental Hazardous Substance List:
To the best of our knowledge, this product does not contain chemicals at levels which require reporting under this statute.
Pennsylvania (Worker and Community Right-To-Know Act): Pennsylvania Special Hazardous Substances List:
To the best of our knowledge, this product does not contain chemicals at levels which require reporting under this statute.

Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) Section 103
To the best of our knowledge, this product does not contain chemicals at levels which require reporting under this statute.

California Proposition 65 (Safe Drinking Water and Toxic Enforcement Act of 1986)
This product contains no listed substances known to the State of California to cause cancer, birth defects or other reproductive harm, at levels which would require a warning under the statute.

Toxic Substances Control Act (TSCA)
All components of this product are on the TSCA Inventory or are exempt from TSCA Inventory requirements under 40 CFR 720.30

16. Other Information

Hazard Rating System

NFPA	Health	Fire	Reactivity
	2	1	0

Revision
Identification Number: 1001102 / 1016 / Issue Date 09/15/2011 / Version: 5.4
DAS Code: GF-1529
Most recent revision(s) are noted by the bold, double bars in left-hand margin throughout this document.

Legend

N/A	Not available
W/W	Weight/Weight
OEL	Occupational Exposure Limit
STEL	Short Term Exposure Limit
TWA	Time Weighted Average
ACGIH	American Conference of Governmental Industrial Hygienists, Inc.
DOW IHG	Dow Industrial Hygiene Guideline
WEEL	Workplace Environmental Exposure Level
HAZ_DES	Hazard Designation
Action Level	A value set by OSHA that is lower than the PEL which will trigger the need for activities such as exposure monitoring and medical surveillance if exceeded.

Dow AgroSciences LLC urges each customer or recipient of this (M)SDS to study it carefully and consult appropriate expertise, as necessary or appropriate, to become aware of and understand the data contained in this (M)SDS and any hazards associated with the product. The information herein is provided in good faith and believed to be accurate as of the effective date shown above. However, no warranty, express or implied, is given. Regulatory requirements are subject to change and may differ between various locations. It is the buyer's/user's responsibility to ensure that his activities comply with all federal, state, provincial or local laws. The information presented here pertains only to the product as shipped. Since conditions for use of the product are not under the control of the manufacturer, it is the buyer's/user's duty to determine the conditions necessary for the safe use of this product. Due to the proliferation of sources for information such as manufacturer-specific (M)SDSs, we are not and cannot be responsible for (M)SDSs obtained from any source other than ourselves. If you have obtained an (M)SDS from another source or if you are not sure that the (M)SDS you have is current, please contact us for the most current version.

United States Environmental Protection Agency | Prevention, Pesticides And Toxic Substances (7508C) | EPA-738-F-98-007 October 1998

EPA R.E.D. FACTS

TRICLOPYR

Pesticide Reregistration

All pesticides sold or distributed in the United States must be registered by EPA, based on scientific studies showing that they can be used without posing unreasonable risks to people or the environment. Because of advances in scientific knowledge, the law requires that pesticides which were first registered before November 1, 1984, be reregistered to ensure that they meet today's more stringent standards.

Under the Food Quality Protection Act of 1996, EPA must consider the increased susceptibility of infants and children to pesticide residues in food, as well as aggregate exposure of the public to pesticide residues from all sources, and the cumulative effects of pesticides and other compounds with a common mechanism of toxicity in establishing or reassessing tolerances.

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

When a pesticide is eligible for reregistration, EPA explains the basis for its decision in a Reregistration Eligibility Decision (RED) document. This fact sheet summarizes the information in the RED document for reregistration case 2710, that includes triclopyr acid, triclopyr triethylamine salt (TEA) and triclopyr butoxyethyl ester (BEE).

Use Profile

Triclopyr TEA and BEE products are used as selective herbicides to control broad leaf weeds and brush on a variety of sites-- rights-of-way, pasture and rangelands, forests, rice, and turf, including home lawns. Triclopyr products are formulated as soluble concentrates, emulsifiable concentrates, liquids (pressurized and ready-to-use), granulars, wettable powders and pellets.

Regulatory History

Triclopyr TEA was first registered in 1979 as an herbicide on non-crop areas and in forestry use for the control of broadleaf weeds and woody plants. Triclopyr BEE was subsequently registered in 1980 for use on the same sites. Both formulations were registered for use on turf sites in 1984. In 1985, triclopyr BEE was registered for use on rangeland and permanent grass pastures. Most recently (1995), triclopyr TEA was registered for use on rice

to control broadleaf weed species. A Data Call-In Notice (DCI) was issued in August 1991 requiring the submission of product chemistry, residue chemistry, ecological and environmental fate data for both TEA and BEE and toxicological data for TEA. At the time of the RED assessments, there were 12 registered products containing triclopyr BEE and 24 products containing triclopyr TEA.

Human Health Assessment

Toxicity

Technical triclopyr acid was found to be slightly toxic by oral and dermal routes and has been placed in Toxicity Category III for these effects. Acceptable studies for acute inhalation, primary eye irritation, primary dermal irritation and dermal sensitization were not available for the technical grade of triclopyr acid. Available data indicate that both BEE and TEA are slightly toxic by oral (Toxicity Category III) and dermal (Toxicity Category III) routes of exposure, and practically non-toxic by inhalation (Toxicity Category IV) and do not cause dermal irritation. In a primary eye irritation study triclopyr TEA was found to be corrosive while BEE was found to be minimally irritating. Both TEA and BEE were found to cause dermal sensitization in test animals.

The Agency has classified triclopyr as a Group D chemical (not classifiable as to human carcinogenicity). This decision was based on increases in mammary tumors in both the female rat and mouse, and adrenal pheochromocytomas in the male rat, which were considered to be only a marginal response, and the absence of additional support from structural analogs or genotoxicity.

The Reference Dose (RfD), the amount of triclopyr residues that could be consumed daily over a lifetime without adverse effects, was established at 0.05 mg/kg/day, based on the 2-generation reproduction toxicity study in rats with a NOEL of 5.0 mg/kg/day, the lowest dose tested. At the next dose level (25 mg/kg/day), an increased incidence of proximal tubular degeneration of the kidneys was observed in P1 and P2 parental rats in this study.

For the acute dietary risk assessment, the endpoint of concern was the maternal and developmental NOEL of 30 mg/kg/day from a developmental toxicity study in rabbits based on a decreased number of live fetuses and other effects at the 100 mg/kg dose.

Because reliable pre- and post-natal data indicate no special sensitivity of young animals to triclopyr residues, EPA finds that an uncertainty factor of 100 (10 for interspecies differences in response, and 10 for intraspecies differences) is adequately protective of infants and children. Therefore, for risk assessment purposes the chronic dietary (RfD) calculations include a factor of 100, and the acute dietary risk assessments assume that a margin of exposure (MOE) of 100 or greater is acceptable.

Dietary Exposure/Risk

People may be exposed to residues of triclopyr through the diet. Triclopyr tolerances have been established for grass forage and hay, meat, meat byproducts, milk and eggs, and rice. EPA's tolerance reassessment indicates only minor changes to the current tolerance expression and tolerance values are needed, provided the label restrictions required by this RED are implemented limiting grazing and application rates.

Calculations using existing triclopyr tolerances result in a TMRC (theoretical maximum residue contribution) which represents < 1% of the RfD for the general population and < 3% of the RfD for children less than one year old, considering food only. These small percentages of the RfD generally indicate little concern for dietary risk.

Chronic aggregate dietary risk estimates, including both food and an upper bound estimate of triclopyr residues in drinking water, account for 16% of the RfD for females 13+ years, and 49% of the RfD for children ages 1 to 6.

The acute dietary (food only) MOE for the most sensitive subgroup, females of child bearing age, is 2500. The acute aggregate dietary MOE for the sub-population of greatest concern (pregnant females 13+) including food and drinking water is 1250.

Both triclopyr and the insecticide chlorpyrifos produce the metabolite 3,5,6-trichloro-2-pyridinol (TCP). TCP is similar in toxicity to triclopyr and less toxic than chlorpyrifos. EPA's aggregate assessment of the known, likely sources of exposure to TCP from both triclopyr and chlorpyrifos uses results in an acute MOE of 600 for females 13 + years. Aggregate chronic exposures could account for up to 90% of the provisional RfD for TCP for non-nursing infants less than 1 year old. Because these estimates include many upper bound exposure assumptions and still fall within acceptable limits, EPA believes that the risks posed by dietary exposure to the metabolite TCP are not of concern.

Occupational and Residential Exposure/Risk

Dermal absorption is calculated to be < 2% based on a study with human volunteers and a rabbit dermal absorption study. Neither occupational nor residential risk assessments for short-term and intermediate-term dermal exposure to triclopyr have been conducted because no adverse effects were seen at the highest dose tested of 1000 mg/kg/day in a 21-day dermal toxicity study in rabbits.

Because the acute inhalation LC_{50} was determined to be > 2.6 mg/L, significant toxicity resulting from inhalation exposure would not be expected, and a separate risk assessment for the inhalation route of exposure is not warranted.

Homeowner exposure to triclopyr is expected to be minimal because of low dermal and inhalation toxicity, and because methods typically used by homeowners do not provide significant exposure (e.g., weed stick), and

treatment areas are usually limited in size. Also, the percent active ingredient and the application rates of homeowner products are less than those for agricultural or industrial use products. No chronic residential or occupational exposures are anticipated.

EPA is working with other agencies and the Native American tribes in California to determine the potential exposure to forestry herbicides that may be occurring to Native Americans through their use of forest plant materials in the making of baskets, for medicinal purposes and in other activities. Work currently underway will characterize the dissipation rate and frequency of occurrence of three herbicides (glyphosate, hexazinone, and triclopyr) in plants of interest to Native Americans. Because this work is ongoing, these unique exposures are not reflected in the triclopyr RED assessments.

FQPA Summary and Findings

Reliable data indicate no special sensitivity of infants and children to triclopyr residues. An uncertainty factor of 100 has been applied in both the chronic and acute dietary risk assessments. Both acute and chronic aggregate dietary (food + drinking water) risks are well within the acceptable range for triclopyr and for the identified sources of TCP, a metabolite common to both triclopyr and chlorpyrifos. EPA has not made a final determination regarding a possible common mechanism of toxicity for triclopyr and other substances or how to include this pesticide in a cumulative risk assessment. For the purposes of the tolerance reassessment in this RED, EPA considered only the risks of triclopyr and TCP in its assessments.

Environmental Fate/Ecological Risks

Triclopyr acid is somewhat persistent, and is mobile. The predominant degradation pathway for triclopyr in water is photodegradation. The predominant degradation pathway in soil is microbial degradation to the major degradate TCP, which is both persistent and mobile.

Triclopyr acid was found to be slightly toxic to birds and practically non-toxic to mammals, insects, freshwater fish and invertebrates. Triclopyr TEA was practically non-toxic to slightly toxic to birds and estuarine/marine invertebrates and practically non-toxic to freshwater fish, freshwater invertebrates and estuarine/marine fish. Testing with BEE indicated it to be slightly toxic to birds, moderately toxic to highly toxic to freshwater fish and estuarine/marine invertebrates, slightly to moderately toxic to freshwater invertebrates, and highly toxic to estuarine/marine fish.

Using current maximum permissible application rates (i.e., up to 12.12 lbs/ae/A), levels of concern (LOE) are exceeded for many species. However, calculating RQs at the revised, lower maximum rates established by the RED indicates that only chronic risk to mammals, acute risk to fish (BEE) and acute risk to non-target plants remain problematical.

Factors that lessen the Agency's concern for these LOC exceedances include several worst-case exposure assumptions that are unlikely under actual use conditions. For example: The screening level chronic assessment is based on 0-hour residues and does not take into account degradation--actual environmental concentrations would be less. Acute risks to fish were calculated assuming direct application to shallow aquatic habitat, which is not currently allowed--flowing water systems would result in rapid dissipation of triclopyr. Because triclopyr is an herbicide, risk to non-target plants is anticipated. However, potential damage to non-targets will be minimized by new spray drift management requirements and reduced application rates. Also, the registrant, Dow Agrosciences (formerly DowElanco), has provided the Agency with survey data indicating that typical application rates range from 0.5 to 4 lbs ae/A, generally much lower than the maximum rates allowed by current labels, and that more than 95% of triclopyr applications occur only once a year or less frequently.

EPA is concerned about the potential chronic toxicity and persistence of the triclopyr degradate, TCP, in the aquatic environment and is requiring additional confirmatory data to better characterize the fate of TCP and its chronic toxicity to fish, particularly salmonid species.

Risk Mitigation Measures

In order to reduce risk to non-target plants and animals, pesticide handlers and the environment, EPA is requiring the following changes to triclopyr use practices and labeling:

! The maximum application rate permitted on pasture and rangeland and all other sites where cattle can be grazed will be 1 lb/ae/A per year; for forestry applications the maximum will be 6 lbs/ae/A; for all other sites the maximum allowed rate will be 8 lb ae/A for the BEE and 9 lb/ae/A for the TEA.

! Labels must include best management practices for spray drift.

! A label statement warning users of the potential of triclopyr to leach to ground water in certain situations is required.

! A restriction against grazing lactating dairy animals until the following season is required. All conflicting grazing instructions must be removed. Labels must specify a 14 day PHI for grass hay, and retain the existing pre-slaughter interval of 3 days.

! An REI of 48 hours for triclopyr TEA, and 12 hours for triclopyr BEE is established for uses within the scope of the Worker Protection Standard; early entry PPE consisting of coveralls, chemical resistant gloves, protective eyewear--for TEA formulations, and shoes+sox) is required.

! Homeowner reentry is restricted until sprays have dried and dusts have settled.

! Additional confirmatory data are required to better characterize the fate of the degradate, TCP, in the aquatic environment and its chronic toxicity to fish. EPA is also requiring product-specific data including product chemistry and acute toxicity studies, and revised Confidential Statements of Formula (CSFs).

Regulatory Conclusion

EPA has determined that the reassessed tolerances for triclopyr meet the safety standard under the FQPA, and that there is a reasonable certainty that no harm will result to infants and children or to the general population from aggregate exposure to triclopyr or TCP residues. The use of currently registered products containing triclopyr in accordance with labeling required by this RED will not pose unreasonable risks of adverse effects to humans or the environment. Therefore, all currently registered uses of these products are eligible for reregistration.

Triclopyr products will be reregistered once the required product-specific data, revised Confidential Statements of Formula, and revised labeling are received and accepted by EPA. These products will be reregistered once any required confirmatory generic data, product specific data, CSFs, and revised labeling are received and accepted by EPA. Products which contain active ingredients in addition to triclopyr will be reregistered when all of their other active ingredients also are eligible for reregistration.

For More Information

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

Electronic copies of the RED and this fact sheet are available on our website at www.epa.gov/REDs.

Printed copies of the RED and fact sheet can be obtained from EPA's National Center for Environmental Publications and Information (EPA/NCEPI), PO Box 42419, Cincinnati, OH 45242-0419, telephone 513-489-8190, fax 513-489-8695.

Following the comment period, the triclopyr RED document also will be available from the National Technical Information Service (NTIS), 5285 Port Royal Road, Springfield, VA 22161, telephone 703-605-6000.

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

For information about the health effects of pesticides, or for assistance in recognizing and managing pesticide poisoning symptoms, please contact the National Pesticides Telecommunications Network (NPTN). Call toll-free 1-800-858-7378, between 9:30 am and 7:30 pm Eastern Standard Time, Monday through Friday.

Krenite S

Active Ingredient

Fosamine Ammonium

SPECIMEN LABEL

Krenite® S

Brush Control Agent

Water-Soluble Liquid

ACTIVE INGREDIENT:	**BY WEIGHT**
Ammonium salt of fosamine [ethyl hydrogen (aminocarbonyl) phosphonate]	41.5%
OTHER INGREDIENTS	58.5%
TOTAL	100.0%

Contains 4 Lbs. Active Ingredient per Gallon.

EPA Reg. No. 42750-247

KEEP OUT OF REACH OF CHILDREN

CAUTION

Si usted no entiende la etiqueta, busque a alguien para que se la explique a usted en detalle.
(If you do not understand the label, find someone to explain it to you in detail.)

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 5 minutes, then continue rinsing eye. • Call a poison control center or doctor for treatment advice.

Have the product container label with you when calling a poison control center or doctor, or going for treatment. You may also contact 1-800-424-9300 for medical emergencies involving this product.

See inside booklet for additional PRECAUTIONARY STATEMENTS.

Manufactured for:
ALBAUGH, INC.
1525 NE 36th Street
Ankeny, Iowa 50021

FOR CHEMICAL SPILL, LEAK, FIRE, OR EXPOSURE, CALL CHEMTREC (800) 424-9300

AD052510
PRODUCT OF CHINA

PRECAUTIONARY STATEMENTS

HAZARDS TO HUMANS AND DOMESTIC ANIMALS

CAUTION! Causes (moderate) eye injury (irritation). Avoid contact with eyes or clothing.

PERSONAL PROTECTIVE EQUIPMENT (PPE)

Applicators and other handlers must wear:

1. Long-sleeved shirt and long pants
2. 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 by cleaning of equipment or disposal of equipment washwaters.

PRODUCT INFORMATION

KRENITE® S brush control agent is a water-soluble liquid to be diluted with water and applied as a foliar spray for control and/or suppression of many woody species.

KRENITE® S may be applied for use in pine plantations and non-crop sites, including highway rights-of-way, industrial sites, railroad rights-of-way, storage areas, utility and pipeline rights-of-way.

This product may be applied in pine plantations and non-crop sites that contain areas of temporary surface water caused by collection of water between planting beds, in equipment ruts, or in other depressions created by management activities. It is permissible to treat intermittent drainage, 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.

KRENITE® S is non-flammable and nonvolatile.

ENVIRONMENTAL CONDITIONS AND BIOLOGICAL ACTIVITY

A KRENITE® S spray directed to only part of susceptible brush species will provide control of the portion sprayed, resulting in a trimming effect. Treatment with KRENITE® S generally does not immediately affect deciduous woody plants; they retain normal foliage for the remainder of the growing season. Treated susceptible plants do not produce foliage or grow the following spring. Coniferous species treated with KRENITE® S generally displays visible symptoms following application.

Effectiveness may be reduced if, following treatment, rainfall occurs on the same day.

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.

TANK MIXES

KRENITE® S herbicide may be tank mixed with other herbicides and/or adjuvant registered for use in pine plantations and non-crop sites.

Follow all use directions, precautions, and restrictions on labels of tank-mixed products.

SPRAY EQUIPMENT

KRENITE® S may be applied using high volume or low volume ground sprayers as well as aircraft (helicopter only).

Application equipment must be calibrated before making applications of KRENITE® S.

SPRAY ADJUVANTS

A penetrating type oil-based adjuvant (surfactant or crop oil concentrate) may be used with KRENITE® S. The adjuvant should be mixed in the spray solution at a minimum concentration of 1/4% by volume (1 quart per 100 gallons of spray solution) or at the manufacturer's recommended dosage.

If foaming is a problem during mixing, an anti-foam agent may be added.

DIRECTIONS FOR USE

It is a violation of Federal law to use this product in a manner inconsistent with its 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 responsible for pesticide regulation.

Do not apply this product through any type of irrigation system.

Do not use on food or feed crops.

KRENITE® S must be used only in accordance with the labeling, or in supplemental Albaugh, Inc. labeling.

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 12 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:

1. Coveralls
2. Shoes plus socks

PINE PLANTATIONS PREPARATION SITE

KRENITE® S may be applied for the post-harvest (pre-plant) control of undesirable pine and hardwood seedlings and saplings and suppression of brush and vines to aid site planting preparation for southern pines and/or genetically improved pines.

APPLICATION INFORMATION

Apply as a foliar spray from mid-summer to when the target tree pests begin defoliation in late summer or fall. Applications of KRENITE® S may be made by ground or air (helicopter only) equipment. Use sufficient water to ensure complete coverage of the vegetation, 20 to 50 gallons per acre by ground and 10 to 15 gallons per acre by air.

USE RATES AND PLANTS CONTROLLED

Pine Seedlings and Saplings

Apply 2 to 4 quarts of KRENITE® S per acre for the control of seedling and sapling pines when burning is allowed on the site.

Apply 4 to 6 quarts per acre of KRENITE® S to control seedling and sapling pines when burning is not allowed on the site.

Use the higher rate when either pine saplings predominate or when high infestations of seedling pines are in the area to be sprayed.

Combinations of Pine and Hardwood Seedlings and Saplings

To control a combination of pine and hardwood seedlings and saplings, apply a tank mixture of KRENITE® S at use rates indicated for spraying pine seedlings and saplings plus Imazapyr (4 pound active per gallon) at 8 to 20 ounces per acre. This tank mix may be applied for the control of Ash, Blackberry, Black gum, Black locust, Box elder, Cherry, Dogwood, Elms (winged, slippery), Oaks (red, white), Red maple, Sassafras, and Sourwood.

Follow all use directions, precautions and restrictions on Imazapyr product labels.

Brush and Vine Suppression

The application of KRENITE® S plus Imazapyr will also provide suppression of brush and vines, such as, American beautyberry (French mulberry), Baccharis (groundsel tree), Vaccinium (blueberry) species, Wax myrtle (bayberry) and Wild grape.

*Suppression – a visible reduction in plant population and/or plant vigor as compared to an untreated area and generally not accepted as control.

Do not apply more than 3 gallons of KRENITE® S per acre per year.

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 entry into treated areas until sprays have dried to perform hand tasks.

NON-CROP SITES

KRENITE® S may be applied for general weed control as follows: uncultivated non-agricultural areas (such as airports, highway, railroad and utility rights-of-way, sewage disposal areas); uncultivated agricultural areas (non-crop producing, which includes: farmyards, fuel storage areas, fence rows, barrier strips); industrial sites (outdoor, such as lumberyards, pipeline and tank farms).

APPLICATION INFORMATION

Make a foliar application of the recommended rate of KRENITE® S from full leaf expansion in the spring to the development of full canopy coloration in the fall for deciduous species to be controlled. Coniferous species, listed in the “USE RATES AND PLANTS CONTROLLED” chart below, may be treated at anytime during the growing season.

LOW- AND HIGH-VOLUME DIRECTED SPRAYS

Prepare either a low-volume or high-volume spray solution of KRENITE® S. For the low-volume directed spray application, do not exceed a spray concentration of 30% by volume. For the high-volume directed spray application, do not use a spray concentration of less than 1.5% by volume.

Prepare the desired volume of spray solution by mixing the amount of this product in water as shown in the Spray Solution Table. Apply a quantity of spray solution which will thoroughly and uniformly cover the target plant foliage (spray to wet for high-volume applications). Rate and volume per acre will depend on the plant species, the height and density of plant growth as well as the type of application equipment used. On tall or dense stands of brush it may be necessary to spray from opposite sides in order to obtain thorough coverage of the foliage. Use the higher rate range on stands where difficult-to-control species are dominant. See the “USE RATES AND PLANTS CONTROLLED” section of the label for use rates and a listing of **difficult-to-control species.

Do not apply more than 6 gallons of KRENITE® S per acre per year.

AERIAL and BROADCAST APPLICATIONS

Prepare a spray solution using 1-1/2 to 3 gallons of KRENITE® S in 10 to 40 gallons of water (see Spray Solution Table). For broadcast ground applications, use this product at the rate of 1.5 to 6 gallons per acre. Do not apply more than 6 gallons per acre when using ground equipment. For aerial applications, use this product at the rate of 1.5 to 3 gallons per acre. Do not apply more than 3 gallons of KRENITE® S per acre when using aerial equipment. Use sufficient spray volume to uniformly and thoroughly cover the foliage. Use the higher concentrations on stands in which difficult-to-control species are predominant (see "USE RATES AND PLANTS CONTROLLED" section for a listing of **difficult-to-control species).

SPRAY SOLUTION TABLE

Desired Volume	Amount of KRENITE® S						
	1.5%	2%	3%	4%	10%	20%	30%
5 Gal	**	**	**	0.8 qt	0.5 gal	1 gal	1.5 gal
10 Gal	0.6 qt	0.8 qt	1.2 qt	1.6 qt	1 gal	2 gal	3 gal
20 Gal	1.2 qt	1.6 qt	0.6 gal	0.8 gal	2 gal	4 gal	6 gal
30 Gal	0.45 gal	0.6 gal	0.9 gal	1.2 gal	3 gal	6 gal	**
40 Gal	0.6 gal	0.8 gal	1.2 gal	1.6 gal	4 gal	**	**
50 Gal	0.75 gal	1 gal	1.5 gal	2 gal	5 gal	**	**
100 Gal	1.5 gal	2 gal	3 gal	4 gal	**	**	**

USE RATES AND PLANTS CONTROLLED

KRENITE® S effectively controls or suppresses (**difficult-to-control listings) the following plants when applied at the use rates shown.

**Suppression – a visible reduction in plant population and/or plant vigor as compared to an untreated area and generally not accepted as control.

1-1/2 to 6 gal KRENITE® S per acre			
Alder, red	*Alnus rubra*	Oak, red	*Quercus rubra*
Ash, white	*Fraxinus Americana*	Oak, water	*Quercus arkansana*
Aspen, quaking	*Populus tremuloides*	Oak, white	*Quercus alba*
Birch	*Betula* sp.	Persimmon**	*Diospyros virginiana*
Blackberry	*Rubus* sp.	Pine, loblolly	*Pinus taeda*
Blackgum	*Nyssa sylvatica*	Pine, Virginia	*Pinus virginiana*
Cherry, black**	*Prunus serotina*	Poplar, yellow (tulip tree)**	*Liriodendron tulipifera*
Cherry, pin	*Prunus pensylvanica*	Salmonberry	*Rubus spectabilis*
Chokecherry, common**	*Prunus virginiana*	Sassafras**	*Sassafras sassafras*
Elm**	*Ulmus* sp.	Sourwood**	*Oxydendrum arboretum*
Fern, bracken	*Pteridium acquilinum*	Spurge, leafy***	*Euphoribia ésula*
Hawthorn**	*Crataegus* sp.	Sumac	*Rhus* sp.
Hickory**	*Carya* sp.	Sweetgum	*Liquidambar styraciflua*
Locust, black	*Robinia pseudoaccacia*	Tallow, Chinese	*Sapium Sebiferum*
Maple, bigleaf**	*Acer macrophyllum*	Thimbleberry	*Rubus parviflorus*
Maple, red**	*Acer rubrum*	Willow**	*Salix* sp.
Maple, vine	*Acer circinatum*		

2 to 6 gal KRENITE® S per acre			
Basswood, American**	*Tilia Americana*	Grape, wild	*Vitis* sp.
Bindweed, field***	*Convolvulus arvensis*	Pine, Eastern white	*Pinus strobes*
Cottonwood, Eastern	*Populus deltoids*	Plum, wild	*Prunus munsoniana*
Elder, American	*Sambucus canadenis*	Rose, multiflora	*Rosa multiflora*
Elm, slippery	*Ulmus rubra*	Sycamore	*Platanus occidentalis*
Elm, winged**	*Ulmus alata*	Tree-of-heaven	*Ailanthus altissima*

**Difficult-to-control or Suppression
Suppression – A visible reduction in plant population and/or plant vigor as compared to an untreated area and generally not accepted as control.

***Make applications after plants begin to bloom.

TANK MIXTURES

KRENITE® S plus ESCORT XP

KRENITE® S plus ESCORT XP may be applied for the control of Eastern red cedar and improved control of Ailanthus (tree of heaven), Ash, Cherry, Elm and Red maple.

Apply 1.5 to 3 gallons of KRENITE® S plus 1 to 2 ounces of ESCORT XP per acre. Apply a quantity of spray solution that will thoroughly and uniformly cover the target brush/trees without causing unnecessary run-off (spray to wet). If the site contains difficult-to-control species (see ** in "USE RATES AND PLANTS CONTROLLED" section), use the higher rates of both KRENITE® S and ESCORT XP.

Follow the use directions, precautions and restrictions on the ESCORT XP label.

KRENITE® S plus imazapyr

KRENITE® S plus imazapyr herbicide (2 pounds active ingredient per gallon) may be applied for the control of Box elder, Hackberry, Persimmon, Wild pecan and Dogwood and for improved control of Ash, Black Cherry, Elm, Maple, Sassafras and Willow.

Apply 1.5 to 3 gallons of KRENITE® S plus 8 to 20 ounces of imazapyr per acre. Apply a quantity of the spray solution that will thoroughly and uniformly cover the target brush without causing unnecessary run-off (spray to wet). If the site contains difficult-to-control species (see ** in "USE RATES AND PLANTS CONTROLLED" section), use the higher rates of both KRENITE® S and imazapyr.

Follow the use directions, precautions and restrictions on the Imazapyr label.

KRENITE® S plus picloram

KRENITE® S plus picloram (2 pound active per gallon) herbicide may be applied for the control of Hackberry, Persimmon, and Walnut for improved control of Cherry, Elm, Hickory, Locust, Oak, Poplar, Sassafras, Sumac, and Sweet gum.

Apply 1.5 to 3 gallons of KRENITE® S plus 1 to 2 pints of picloram per acre. Apply a quantity of the spray solution that will thoroughly and uniformly cover the target brush without causing unnecessary run-off (spray to wet). If the site contains difficult-to-control species (see ** in "USE RATES AND PLANTS CONTROLLED" section), use the higher rates of both KRENITE® S and picloram.

Follow the use directions, precautions and restrictions on the picloram label.

SIDE TRIMMING

For control of only a portion of a plant, direct the spray solution to thoroughly cover (spray to wet) only the portion of the plant to be controlled.

Do not apply more than 6 gallons of KRENITE® S per acre when side trimming.

CUT SURFACE APPLICATIONS

KRENITE® S may be used for controlling the re-sprouting of cut stumps of the plants listed in the "USE RATES AND PLANTS CONTROLLED" section. Control of re-sprouting in plants listed as "difficult to control" may not be as effective.

KRENITE® S may either be used undiluted or mixed with water. Use the method that is best suited for the particular application equipment. When mixing with water a ratio of no less than 1 part KRENITE® S to 1 part water on a volume basis must be used. Apply the undiluted or mixed solution to wet the area adjacent to the cambium and bark around the entire circumference and the sides of the cut stumps. The sides of the stumps should be wet down to the root collar area.

Apply with appropriate application equipment using low spray pressure. Applications can be made any time of the year, except during periods of heavy sap flow in the spring. Applications should be made soon after cutting, before the stump surface forms a layer of callous tissue (hardens off).

To prevent freezing of the spray solution, add ethylene glycol (commercial antifreeze) to the water used in preparing the spray solution. Add the antifreeze according to the manufacturer's label for preventing freezing of water at the lowest expected ambient temperature. KRENITE® S will freeze at -11°F. A 1:1 aqueous dilution of KRENITE® S will freeze at 21°F.

A spray pattern indicator may be used in the spray solution to facilitate application. The user should check the compatibility of the spray indicator with the spray solution prior to using large quantities.

ADDITIONAL USE INSTRUCTIONS – PINE PLANTATIONS AND NON-CROP SITES

MIXING INSTRUCTIONS

1. Fill spray tank 1/2 full of water.
2. With the agitator running, add the desired amount of KRENITE® S.
3. If using a tank mix partner, add the recommended amount. Follow the use precautions and directions on the tank mix partner label.
4. Add spray adjuvant as last ingredient prior to filling the spray tank with water.
5. Agitate the spray solution thoroughly.

After KRENITE® S has been thoroughly mixed in the spray tank, agitation of the spray solution is not required.

SPRAY CLEAN-UP

Thoroughly clean all mixing and spray equipment immediately following applications of KRENITE® S. Flush tank, pump, hoses and boom with several changes of water after removing the nozzle tips and screens (clean these parts separately).

Dispose of the rinsate on a labeled site or at an approved waste disposal facility.

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 of these factors when making applications.

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 (HELICOPTER)

- 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 AND HEIGHT

- Boom Length (helicopter) – For helicopters use a boom length and position that prevents droplets from entering the rotor vortices.
- Boom Height (helicopter) – Application more than 10 feet above the canopy increases the potential for spray drift.
- Boom Height (ground) – Setting the boom at the lowest height which provides uniform coverage reduces the exposure of droplets to evaporation and wind. 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 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.

IMPORTANT PRECAUTIONS – PINE PLANTATIONS AND NON-CROP SITES

- Cutting of treated stems of brush before they are completely dead may result in sprouting.
- Do not use for the control of woody plants on lawns, walks, driveways, tennis courts or similar areas.
- Drift or spray mist contact with desirable trees, shrubs, or other plants may result in injury.
- Not registered for sale or use in California or Arizona.

STORAGE AND DISPOSAL

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

PESTICIDE STORAGE: Do not store below 10°F. Store product in original container only. Store in a cool, dry place.

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

CONTAINER HANDLING: Refer to the Net Contents section of this product's labeling for the applicable "Nonrefillable Container" or "Refillable Container" designation.

Nonrefillable Rigid Plastic and Metal Containers (Capacity Equal to or Less Than 5 Gallons):
Nonrefillable container. Do not reuse or refill this container. Triple rinse container (or equivalent) promptly after emptying.

Triple rinse as follows: Empty the remaining contents into application equipment or a mix tank and drain for 10 seconds after the flow begins to drip. Fill the container 1/4 full with water and recap. Shake for 10 seconds. Pour rinsate into application equipment or a mix tank or store rinsate for later use or disposal. Drain for 10 seconds after the flow begins to drip. Repeat this procedure two more times. Then, for Plastic Containers, offer for recycling if available or puncture and dispose of in a sanitary landfill, or by incineration. Do not burn, unless allowed by state and local ordinances. For Metal Containers, offer for recycling, if available, or reconditioning, if appropriate, or puncture and dispose of in a sanitary landfill, or by other procedures approved by state and local authorities.

Nonrefillable Rigid Plastic and Metal Containers (Capacity Greater Than 5 Gallons):
Nonrefillable container. Do not reuse or refill this container. Triple rinse container (or equivalent) promptly after emptying.

Triple rinse as follows: Empty the remaining contents into application equipment or a mix tank. Fill the container 1/4 full with water. Replace and tighten closures. Tip container on its side and roll it back and forth, ensuring at least one complete revolution, for 30 seconds. Stand the container on its end and tip it back and forth several times. Turn the container over onto its other end and tip it back and forth several times. Empty the rinsate into application equipment or a mix tank or store rinsate for later use or disposal. Repeat this procedure two more times. Then, for Plastic Containers, offer for recycling, if available, or puncture and dispose of in a sanitary landfill, or by incineration. Do not burn, unless allowed by state and local ordinances.

For Metal Containers, offer for recycling, if available, or reconditioning, if appropriate, or puncture and dispose of in a sanitary landfill, or by other procedures approved by state and local authorities.

Nonrefillable Rigid Plastic and Metal Containers, e.g., Intermediate Bulk Containers (IBC) [Size or Shape Too Large to be Tipped, Rolled or Turned Upside Down]:
Nonrefillable container. Do not reuse or refill this container. Clean container promptly after emptying the contents from this container into application equipment or mix tank and before final disposal using the following pressure rinsing procedure. Insert a lance fitted with a suitable tank cleaning nozzle into the container and ensure that the water spray thoroughly covers the top, bottom and all sides inside the container. The nozzle manufacturer generally provides instructions for the appropriate spray pressure, spray duration and/or spray volume. If the manufacturer's instructions are not available, pressure rinse the container for at least 60 seconds using a minimum pressure of 30 PSI with a minimum rinse volume of 10% of the container volume. Drain, pour or pump rinsate into application equipment or rinsate collection system. Repeat this pressure rinsing procedure two more times. Then, for Plastic Containers, offer for recycling, if available, or puncture and dispose of in a sanitary landfill, or by incineration. For Metal Containers, offer for recycling, if available, or reconditioning if appropriate, or puncture and dispose of in a sanitary landfill, or by other procedures approved by state and local authorities.

All Refillable Containers:
Refillable container.
Refilling Container: Refill this container with KRENITE® S containing ammonium salt of fosamine only. Do not reuse this container for any other purpose. Cleaning before refilling is the responsibility of the refiller. Prior to refilling, inspect carefully for damage such as cracks, punctures, abrasions, worn out threads and closure devices. If damage is found, do not use container, contact Albaugh, Inc. at the number below for instructions. Check for leaks after refilling and before transporting. If leaks are found, do not reuse or transport container; contact Albaugh, Inc. at the number below for instructions.

Disposing of Container: Do not reuse this container for any other purpose other than refilling (see proceeding). Cleaning the container before final disposal is the responsibility of the person disposing of the container. To clean the container before final disposal, use the following pressure rinsing procedure. Insert a lance fitted with a suitable tank cleaning nozzle into the container and ensure that the water spray thoroughly covers the top, bottom and all sides inside the container. The nozzle manufacturer generally provides instructions for the appropriate spray pressure, spray duration and/or spray volume. If the manufacturer's instructions are not available, pressure rinse the container for at least 60 seconds using a minimum pressure of 30 PSI with a minimum rinse volume of 10% of the container volume. Drain, pour or pump rinsate into application equipment or rinsate collection system. Repeat this pressure rinsing procedure two more times. Then, for Plastic Containers, offer for recycling, if available, or puncture and dispose of in a sanitary landfill, or by incineration. Do not burn, unless allowed by state and local ordinances. For Metal Containers, offer for recycling, if available, or reconditioning if appropriate, or puncture and dispose of in a sanitary landfill, or by other procedures approved by state and local authorities.

Do not transport if container is damaged or leaking. If the container is damaged, leaking or obsolete, or in the event of a major spill, fire or other emergency, contact Albaugh, Inc. at 1-800-424-9300, day or night.

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

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 fanning techniques, presence of other materials, the manner of use or application, or other unknown factors, all of which are beyond the control of Albaugh, Inc. These risks can cause: ineffectiveness of the product; crop injury, or; injury to non-target crops or plants.

Albaugh, Inc. does not agree to be an insurer of these risks. **TO THE EXTENT CONSISTENT WITH APPLICABLE LAW, WHEN YOU BUY OR USE THIS PRODUCT, YOU AGREE TO ACCEPT THESE RISKS.**

Albaugh, Inc. 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.

ALBAUGH, INC. MAKES NO OTHER EXPRESS OR IMPLIED WARRANTY OF FITNESS OR OF MERCHANTABILITY OR ANY OTHER EXPRESS OR IMPLIED WARRANTY.

TO THE FULLEST EXTENT PERMITTED BY LAW, IN NO EVENT SHALL ALBAUGH, INC. 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. TO THE EXTENT CONSISTENT WITH APPLICABLE LAW THE EXCLUSIVE REMEDY OF THE USER OR BUYER AND THE EXCLUSIVE LIABILITY OF ALBAUGH, INC. 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 ALBAUGH, INC. OR SELLER, THE REPLACEMENT OF THE PRODUCT.

Albaugh, Inc. 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 Albaugh, Inc. or an Albaugh, Inc. 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.

MATERIAL SAFETY DATA SHEET

SECTION 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

COMPANY ADDRESS:
ALBAUGH, INC.
Ankeny, IA 50021

EMERGENCY TELEPHONE NUMBERS:
(800) 424-9300 (CHEMTREC, transportation and spills)

PRODUCT NAME : **KRENITE S**
CHEMICAL NAME : Ammonium salt of Fosamine
CHEMICAL FAMILY : Herbicide
PRODUCT CODE : EPA Reg. No. 42750-247

SECTION 2 - COMPOSITION, INFORMATION OF INGREDIENTS

COMPONENT	PERCENTAGE	CAS NUMBER	OSHA PEL	ACIGH TLV
Ammonium Salt of Fosamine	41.5 %	25954-13-6	NOT EST	NOT EST
Inert Ingredients	58.5 %	n/a	n/a	n/a

SECTION 3 - HAZARDS IDENTIFICATION SUMMARY

(As defined by OSHA Hazard Communication Standard, 29 CFR 1910.1200)

HEALTH HAZARDS: CAUTION. Causes moderate to severe eye irritation..
PHYSICAL HAZARDS: May release toxic gasses when burned
ENVIRONMENTAL HAZARDS: May be toxic to non-target plants.

SECTION 4 - FIRST AID MEASURES

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 treatment advice.

Have the product container or label with you when calling a poison control center or doctor, or going for treatment.

SECTION 5 - FIRE FIGHTING MEASURES

FLASH POINT (method): Will not flash.
FLAMMABLE LIMITS: Not Established
FIRE AND EXPLOSION HAZARD: May decompose in fire due releasing irritating or toxic gases.
EXTINGUISHING MEDIA: Use water spray, foam or dry chemical.
FIGHTING INSTRUCTIONS: Evacuate area and fight fire upwind from a safe distance to avoid hazardous vapors and decomposition products. Foam or dry chemical extinguishing systems recommended to prevent environmental damage due to water run off.
FIREFIGHTING EQUIPMENT: Self-contained breathing apparatus with full facepiece. Full firefighting turn-out gear (Bunker gear).
HAZARDOUS COMBUSTION PRODUCTS: Unknown

SECTION 6 - ACCIDENTAL RELEASE MEASURES

Clean up spills immediately, observing precautions in Section 8 of this document. Isolate hazard area. Keep unnecessary and unprotected personnel from entering.

SMALL SPILL: Absorb small spills on sand, vermiculite or other inert absorbent. Place contaminated material in appropriate container for disposal.
LARGE SPILL: Dike large spills using absorbent or impervious material such as clay or sand. Recover and contain as much free liquid as possible for reuse. Allow absorbed material to solidify, and scrape up for disposal. After removal, scrub the area with detergent and water and neutralize with dilute alkaline solutions of soda ash, or lime.

Wear appropriate personal protection equipment. (See Section 8 Exposure Controls, Personal Protection.)

SECTION 7 - HANDLING AND STORAGE

CAUTION KEEP OUT OF REACH OF CHILDREN!

HANDLING: Use only in a well-ventilated area. Wear appropriate safety equipment when handling.
STORAGE: Store in original container with lid tightly closed. Keep away from food, feed and drinking water.

SECTION 8 - EXPOSURE CONTROLS, PERSONAL PROTECTION

EXPOSURE LIMITS (8 hour TWA, ppm): Refer to Section 3.

ENGINEERING CONTROLS: Proper ventilation is required when handling or using this product to keep exposure to airborne contaminants below the exposure limit. Local mechanical exhaust ventilation may be required. Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower.

PERSONAL PROTECTIVE EQUIPMENT:
EYE PROTECTION - Safety goggles when mixing, loading or cleaning equipment is recommended.
CLOTHING – Long-sleeved shirt and long pants, Shoes plus socks,
GLOVES – Waterproof gloves when mixing, loading or cleaning equipment is recommended.

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

SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL DESCRIPTION:	Clear to amber liquid.
ODOR:	Slight ammonia like.
SPECIFIC GRAVITY:	1.17 (9.7 – 9.9 lb/gl)*
pH:	Unknown
VAPOR PRESSURE:	Unknown
WATER SOLUBILITY:	Emulsifies.

*Listed density is an approximate value and does not necessarily represent that of a specific batch.

SECTION 10 - STABILITY AND REACTIVITY

CHEMICAL STABILITY: Stable, however may decompose if heated.
CONDITIONS TO AVOID: Avoid temperatures above (115°F, 46°C) and below 25°F (-5°C).
INCOMPATIBILITY WITH OTHER MATERIALS: Strong oxidizers or bases, mild and galvanized steel.
HAZARDOUS DECOMPOSITION PRODUCTS: Carbon monoxide, Nitrogen oxides, phosphorous oxides.
HAZARDOUS POLYMERIZATION: Product will not undergo polymerization.

SECTION 11 - TOXICOLOGICAL INFORMATION

ACUTE TOXICITY:

Oral LD_{50} (rat)	- > 5,000 mg/kg
Dermal LD_{50} (rabbit)	- > 5,000 mg/kg
Inhalation LC_{50} (rat)	- > 5.5 mg/L
Eye Irritation (rabbit)	- Moderate to severe
Skin Irritation (rabbit)	- Mild
Sensitization (guinea pig)	- Non-sensitizer

CARCINOGEN STATUS:
OSHA - Not listed
NTP - Not listed
IARC - Not listed

MUTAGENIC DATA: No evidence of mutagenic effects during *in vivo* or *in vitro* studies.
ADDITIONAL DATA: None

SECTION 12 - ECOLOGICAL INFORMATION

ENVIRONMENTAL SUMMARY: 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.

FISH TOXICITY: (Fosamine ammonium)
96 hour LC_{50}, Rainbow trout – 330 mg/L
96 hour LC_{50}, Bluegill – 590 mg/L
AVIAN TOXICITY: (Glyphosate acid)
Oral LD_{50}, Bobwhite quail – > 5,000 mg/Kg
Oral LD_{50}, Mallard duck – > 5,000 mg/Kg
BEE: Unknown

SECTION 13 - DISPOSAL CONSIDERATIONS

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

WASTE: Waste resulting from the use of this product may be disposed of on site or at an approved waste disposal facility.
CONTAINER: Container cleaning and disposal depends on the type of container being used. Refer to product label for appropriate cleaning and disposal instructions.

SECTION 14 - TRANSPORT INFORMATION

DOT SHIPPING DESCRIPTION: Not regulated by DOT

DOT HAZARD CLASS: N/A
UN NUMBER: N/A
DOT PACKING GROUP: N/A
DOT PRIMARY/SECONDARY LABEL: N/A
DOT PRIMARY/SECONDARY PLACARD: N/A
DOT EMERGENCY RESPONSE GUIDE #: N/A

SECTION 15 - REGULATORY INFORMATION

CERCLA REPORTABLE QUANTITY: Not listed

SARA TITLE III STATUS:
311/312 Hazard Categories – Immediate Health
313 Toxic Chemicals – None known

CALIFORNIA PROP 65: Not listed

SECTION 16 - OTHER INFORMATION

HMIS HAZARD RATINGS	HEALTH	1
	FLAMMABILITY	0
	PHYSICAL HAZARD	1
	4=Severe 3=Serious 2=Moderate 1=Slight 0=Minimal	

DISCLAIMER: The information presented herein is based on available data from reliable sources and is correct to the best of Albaugh's knowledge. Albaugh makes no warranty, express or implied, regarding the accuracy of the data or the results obtained from the use of this product. Nothing herein may be construed as recommending any practice or any product in violation of any law or regulations. The user is solely responsible for determining the suitability of any material or product for a specific purpose and for adopting any appropriate safety precautions.

REVISED DATE: August, 2012
REFERENCE: Initial release

United States Environmental Protection Agency | Prevention, Pesticides And Toxic Substances (7508W) | EPA-738-F-95-005 January 1995

R.E.D. FACTS

Fosamine ammonium

Pesticide Reregistration

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

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

When a pesticide is eligible for reregistration, EPA announces this and explains why in a Reregistration Eligibility Decision (RED) document. This fact sheet summarizes the information in the RED document for reregistration case 2355, fosamine ammonium.

Use Profile

Fosamine ammonium is an herbicide/plant growth regulator used to control brush and herbaceous plants on noncropland. It is applied to nonagricultural rights-of-way (e.g. highways, railroads, and utilities), industrial sites, and fencerows.

Fosamine ammonium is formulated in end use products as a water soluble liquid. It is applied once per year from Spring to early Fall, by aircraft, backpack and handwands. After application, the brush control effects of the pesticide are achieved by inhibiting bud growth the following year.

Use practice limitations prohibit fosamine ammonium from being used on croplands or in irrigation systems. It may not be applied directly to water, or areas where surface water is present, including intertidal areas. Soils treated with this herbicide cannot be converted to food/feed croplands within one year of treatment.

Fosamine ammonium is not registered for use in California and Arizona.

Regulatory

Fosamine ammonium was first registered as a pesticide in the U.S. in

History

1975. It was registered for non-cropland (non-food use) areas such as railroads, pipelines, utility and highway rights-of way, reforestation areas, drainage ditch banks, storage areas, industrial plants, and other similar sites. However, this product was voluntarily cancelled on June 22, 1994.

A second product was registered in 1980 with the same uses as the original product except for reforestation uses. This product currently is marketed under two trade names. The registrant requested to voluntarily cancel direct applications to water, ditch banks, and to other sites which are adjacent to and surrounding domestic water supply reservoirs, supply streams, lakes and ponds. The Agency is processing this request, which involves publishing a Notice of Intent to delete these uses in the Federal Register. Because there are no other current registrants and there are outstanding environmental data requirements to support continued registration of these uses, the Agency expects that these sites will be deleted from the label by early 1995.

Human Health Assessment

Toxicity

Fosamine ammonium is classified as Toxicity Category II for acute dermal studies in mammalian species. This classification represents the second most severe level of acute toxicity for studies using laboratory animals (Toxicity Category I is the highest). Fosamine ammonium is very mildly toxic for acute oral and acute inhalation (Toxicity Category IV), and is not a dermal sensitizer.

In one subchronic oral study, the laboratory animals given the highest dose of fosamine ammonium exhibited some statistically significant effects, including effects to the kidneys, bladder and decreases in body weight. There were no subchronic neurotoxic effects of fosamine ammonium at any dose level.

Fosamine ammonium displayed some mutagenic potential in one in vitro test for chromosome aberrations, while four other tests were negative for mutagenic potential.

Dietary Exposure

Since there are no registered food uses for fosamine ammonium, no dietary exposure is expected.

Occupational and Residential Exposure

Based on current use patterns, workers may be exposed to fosamine ammonium during and after application of the pesticide. Worker exposure estimates are based on the assumption that workers wear long pants, long sleeved shirt, shoes, and no gloves, except for workers using backpacks (who are assumed to wear chemical resistant gloves). The primary route of exposure to fosamine ammonium is expected to be dermal. Another potential route of exposure is through inhalation. However, based on the exposure assumptions, the potential for inhalation exposure is negligible.

Human Risk Assessment

Since no food uses are registered, fosamine ammonium poses no human dietary risks. Regarding acute toxicity, fosamine ammonium falls in Toxicity Category II for acute dermal exposure. However, the mild skin effects observed with this chemical do not trigger any significant toxicological concerns. The herbicide/plant growth regulator is of low toxicity by the oral and inhalation routes. Based on the mixed results of studies suggesting mutagenetic potential, the Agency is requiring additional testing with germ cells as a confirmatory study.

Based on the current use pattern of fosamine ammonium, the estimated exposure to workers, which is likely to reflect a worse-case scenario, does not pose a serious threat to workers. However, there are no known significant acute or chronic toxicological endpoints that warrant the establishment of risk mitigation measures or minimum personal protective equipment (PPE) requirements to protect handlers of the pesticide. Clothing as described in the exposure assessment will provide adequate protection to handlers. In addition, EPA is requiring application restrictions and user safety recommendations on end-use product labeling.

Environmental Assessment

Environmental Fate

Fosamine ammonium is not very persistent under aerobic or anaerobic conditions and degrades rapidly in most soils. Dissipation of fosamine ammonium is dependent on rapid, microbial mediated degradation. Thus, in field studies fosamine ammonium was found to be highly soluble in water and is mobile in various soils. However, in the sterile conditions of the laboratory, fosamine ammonium is stable to hydrolysis. Although fosamine ammonium is a mobile compound, there is little evidence that leaching is a major route of dissipation. Data on the residues of fosamine ammonium indicate they are also relatively mobile.

Fosamine ammonium may be found in surface waters with low microbiological activities or long hydrological residence times.

Exposure of fosamine ammonium to non-target aquatic plants can result from spray drift from treated areas, surface runoff, or wind blown soil particles. However, no acute risk quotients exceed the level of concern, so no acute effects to aquatic plants are expected from the normal use of fosamine ammonium.

The risk to terrestrial non-target plants cannot be determined until Tier I and Tier II data requirements have been fulfilled. Results of the most sensitive terrestrial plant species tested are needed in order to conduct an acute risk assessment.

Any movement of fosamine ammonium from the treatment site via spray drift, surface runoff, or wind blown soil particles can adversely affect non-target and endangered/threatened plants. Direct application of rights-of-way are a special concern, because large numbers of endangered plants grow in rights-of-way areas. Thus applications of fosamine ammonium at

the registered rates may pose a significant risk to endangered plant species inhabiting treated rights-of-way.

EPA has been working with the U.S. Fish and Wildlife Service and other federal and state agencies to develop a program to avoid jeopardizing endangered species. The Endangered Species Program is expected to be final soon. Further limitations on the use of fosamine ammonium may be imposed at that time.

Further droplet size spectrum and field drift studies are due to the Agency at the end of June 1995 as part of the spray drift data requirements to be submitted by the Spray Drift Task Force. If the new data suggest substantially different drift potential, the Agency will reassess its impact on the associated environmental risks at that time.

Ecological Effects

Exposure to non-target aquatic organisms can result from spray drift and runoff from treated areas. However, acute effects to freshwater fish and aquatic invertebrates are not expected from the normal use of fosamine ammonium. Fosamine ammonium is practically nontoxic to coldwater and warmwater fish, and does not appear to bioaccumulate in fish. However, a nine percent fish mortality was observed in the accumulation in fish study. Fosamine ammonium is practically nontoxic to freshwater invertebrates and to estuarine species.

Fosamine ammonium is practically nontoxic to honey bees, which are used to assess the effects on non-target insects.

Fosamine ammonium is practically nontoxic to avian species on an acute oral and a subacute dietary basis. Mixed results were found in the avian reproductive studies. In one mallard duck study, there was some indication of chronic reproductive effects. However, in another avian reproductive study, using the bob white quail as the test organism, there were no reproductive effects at any dose level.

Fosamine ammonium is practically nontoxic to small mammalian species. Acute oral and subacute dietary risks to non-endangered and endangered non-target mammals are not expected to result from current label uses.

Ecological Effects Risk Assessment

Based on the data, fosamine ammonium dissipation is predominantly dependent on rapid microbial-mediated degradation. It is also mobile in mineral soils. However, fosamine ammonium should not pose a threat to groundwater or surface waters because it rapidly degrades in aerobic and anaerobic environments. There are no Maximum Concentration Levels

(MCLs) or drinking water health advisories for fosamine ammonium or its degradates.

The health and environmental data on fosamine ammonium indicate a low level of toxicity of this pesticide. However, the inconclusive results in the avian reproductive studies have led the Agency to require a new mallard duck reproduction study on a confirmatory basis. In addition, risk mitigation measures are required to reduce the potential for avian reproductive effects.

Additional Data Required

EPA is requiring the following additional generic data for fosamine ammonium to confirm its regulatory assessments and conclusions: Certification of limits (62-2), Avian reproduction, mallards (71-4b), In-vivo cytogenetics (84-2a), Droplet size spectrum and field drift data (201-1, 202-1), Method validation for worker exposure (231, 232), Terrestrial plant (122-1, 123-1), and Aerobic aquatic (164-2, 162-4) if aquatic sites are not deleted.

The Agency also is requiring product-specific data including product chemistry and acute toxicity studies, revised Confidential Statements of Formula (CSFs) and revised labeling for reregistration.

Product Labeling Changes Required

All fosamine ammonium end-use products must comply with EPA's current pesticide product labeling requirements, and with the following:

a) Within the Environmental Hazards section of the Precautionary Statement of the label:

> "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."

b) To reduce environmental loading and potential exposure to non-target species, the product label must include language to limit use as outlined below:

> i) the end-use product can be applied only once annually during the period after spring growth has hardened to the development of fall coloration in deciduous species, and
>
> ii) the maximum application rate for low shrubs/brush is 16 lb a.i./A, and for tall dense woody species with very heavy foliage can be 24 lb a.i./A.

c) The end-use product labels cannot include directions for applications to aquatic sites. The current, sole registrant has submitted an application for amended registration to delete these uses from its product registration. Future submissions of appropriate data to support registration for these uses will be considered by the Agency.

d) The Agency is requiring the following labelling statements to be located on all end-use products containing fosamine ammonium:

> Application Restrictions:

"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 applications."

Entry Restrictions

The Agency is establishing the following entry restrictions for the occupational uses of fosamine ammonium end-use products:

For liquid applications:

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

Other Labelling Requirements:

User Safety Recommendations:

"Users should wash hands before eating, drinking, chewing gum, using tobacco, or using the toilet."

"Users should remove clothing immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing."

"Users should remove clothing immediately after handling this product. If gloves are worn, wash the outside of gloves before removing. As soon as possible, wash thoroughly and change into clean clothing."

These statements must be included on the labels, as they are appropriate, after product-specific PPE requirements are set by the Agency. Although it is not required under the current labeling, it is assumed that the workers wear long pants, long sleeved shirts, shoes, and socks.

Regulatory Conclusion

The use of currently registered products containing fosamine ammonium in accordance with approved labeling, except use in aquatic sites, will not pose unreasonable risks or adverse effects to humans or the environment. The registrant has voluntarily requested cancellation of the aquatic uses. The Agency is not including the aquatic uses in its eligibility decision, because of the inadequate environmental data and the impending deletion of those uses from all current registrations. Therefore, all uses of fosamine ammonium products, other than application to aquatic sites, are considered eligible for reregistration.

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

For More Information

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

Pesticide Programs (OPP), US EPA, Washington, DC 20460, telephone 703-305-5805.

Electronic copies of the RED and this fact sheet can be downloaded from the Pesticide Special Review and Reregistration Information System at 703-308-7224. They also are available on the Internet on EPA's gopher server, *GOPHER.EPA.GOV,* or using ftp on *FTP.EPA.GOV*, or using WWW (World Wide Web) on *WWW.EPA.GOV*.

Printed copies of the RED and fact sheet can be obtained from EPA's National Center for Environmental Publications and Information (EPA/NCEPI), PO Box 42419, Cincinnati, OH 45242-0419, telephone 513-489-8190, fax 513-489-8695.

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

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

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

Arborchem Basal Oil

Active Ingredient

Natural & Petroleum

Distillates

ARBORCHEM

BASAL OIL

KEEP OUT OF REACH OF CHILDREN

CAUTION

GENERAL INFORMATION

ARBORCHEM BASAL OIL is a unique blend of natural and synthetic chemicals, specially formulated as a diluent oil for Low and Ultra Low Volume basal spray applications.

DIRECTIONS FOR USE

The following is a general recommended use procedure. Other ratios and procedures may be more effective for special situations. Consult the herbicide manufacturers and ARBORCHEM Products Co. for details.

Blend the herbicide(s) with ARBORCHEM BASAL OIL at a 1:4 (20%) or 1:3 (25%) ratio. Normal mixing is required. Stir until a clear solution is obtained, no further agitation is needed. DO NOT exceed the herbicide label rate per acre.

Example: To make a 1:4 ratio, or 20% herbicide mixture, add 1 part herbicide(s) to 4 parts ARBORCHEM BASAL OIL. Spray at 5-10 gallons per acre using the ARBORCHEM Spray Wand.

ADJUVANTS, SPRAYABLE PRODUCT
COMBUSTIBLE LIQUID, NA-1993

Dist. By: **ARBORCHEM Products Co.**
943 Nixon Drive
Mechanicsburg, PA 17055

K6L122G

CAUTION

PRECAUTIONARY STATEMENTS
HAZARDS TO HUMANS AND DOMESTIC ANIMALS

Harmful if swallowed. Avoid contact with eyes, skin and clothing. Avoid breathing spray mist. If sprayed in eyes, flush thoroughly with water and get medical attention.

PHYSICAL HAZARDS

Combustible. Do not use near fire, sparks or open flame.

ENVIRONMENT HAZARDS

Do not apply directly to water. Do not contaminate water by cleaning of equipment or disposal of wastes.

STORAGE AND DISPOSAL

Do not contaminate water, food or feed by storage or disposal. Destroy empty container so that it cannot be used again for any purpose.

LIMITED WARRANTY AND DISCLAIMER

Arborchem warrants that the composition of this product conforms to the ingredient statement and that the product is suited to the purposes described when used according to directions. The use of this product being beyond the manufacturer and distributor, no guarantee, expressed or implied, is made as to the effects or results of be obtained if not used in accordance with directions or established safe practices. Buyer accepts all risks of use, storage or handling of this material not in strict accordance with direction given herewith.

Made in U.S.A.

SPECIMEN LABEL

MATERIAL SAFETY DATA SHEET
CHEMORSE, LTD

MSDS NUMBER: 10011 **DATE REVISED: 1/01/08**

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: Arborchem Low Odor Basal Oil

DESCRIPTION: Agricultural Adjuvant

MANUFACTURER: CHEMORSE, LTD
1596 NE 58th Avenue
Des Moines, IA 50313

EMERGENCY CONTACT: In the event of chemical emergencies involving a spill, leak, fire exposure, or accident involving chemicals -- call **CHEMTREC (800) 424-9300**.

2. COMPOSITION/INFORMATION ON INGREDIENTS

COMPONENTS

Aliphatic and Cyclic Based Natural and Petroleum Distillates 100%

HAZARDOUS INGREDIENTS:

Hydrotreated Petroleum Distillates	CAS#: 64742-46-7
Hydrotreated Petroleum Distillates	CAS#: 64741-89-5
Hydrotreated Petroleum Distillates	CAS#: 64742-56-9

Hazards Ratings:

	Health	Fire	Reactivity	PPI
NFPA	1	1	0	
HMIS	1	1	0	X

EXPOSURE STANDARDS:
The ACGIH has established a TLV of 5 mg/m3 in 8 hours and a STEL of 10 mg/m3 in 15 minutes for petroleum distillates.

3. HAZARDS IDENTIFICATION

********** EMERGENCY OVERVIEW **********

Clear, light yellow liquid with mild odor. Primary irritation to eyes and skin.

POTENTIAL HEALTH EFFECTS:

EYE:
Primary irritation to eyes; redness, tearing, blurred vision.

SKIN:
Prolonged or frequent skin contact may cause various skin disorders such as dermatitis, folliculits, oil acne, skin acne, and edema.

INHALATION:
No hazard in normal industrial use.

INGESTION:
Substance may be harmful if swallowed.

4. FIRST AID MEASURES

EYES:
For eye contact, flush with plenty of water for 15 minutes and get medical attention if irritation persists.

SKIN:
In case of skin contact, remove exposed clothing and wash exposed skin with fresh water for 15 minutes. Seek immediate medical attention from a physician if irritation persists.

INHALATION:
Vapor pressure is very low. Vapor inhalation under ambient conditions is normally not a problem. If overcome by vapor from hot product, immediately remove from exposure and call a physician. If breathing is irregular or has stopped, state resuscitation; administer oxygen, if available.

INGESTION:
If ingested, DO NOT induce vomiting; call a physician immediately.

5. FIRE FIGHTING MEASURES

FLASH POINT
> 230° F

AUTOIGNITION TEMPERATURE:
Not available

FLAMMABLE LIMITS:
Lower: Not determined
Upper: Not determined

EXTINGUISHING MEDIA:
Foam, water spray (fog), dry chemical, carbon dioxide, and vaporizing liquid type extinguishing agents may all be suitable for extinguishing fires.

SPECIAL FIRE FIGHTING PROCEDURES:
Water spray may be ineffective on fire but can protect fire fighters and cool closed containers. Use fog nozzles if water is used. Do not enter confined fire space without full bunker gear. (Helmet with face shield, bunker coats, gloves and rubber boots). Use a NIOSH approved positive-pressure self-contained breathing apparatus.

6. ACCIDENTAL RELEASE MEASURES

ACCIDENTAL RELEASE:
An unauthorized release of this material to the environment may be reportable under federal law to the National Response Center. Also, state and local authorities may have additional reporting requirements of which the user of this material should be aware. Use emergency response personnel if spill is beyond the capability of in-house personnel. For small spills, dike and absorb spilled liquid with an inert absorbent. Prevent entry into sewers or waterways. Wear appropriate personal protective equipment and avoid contact with skin, eyes or clothing.

7. HANDLING AND STORAGE

HANDLING:
Avoid contact with eyes. Do not use, spill, or store near heat or open flame. Keep this container closed when not in use and take care to prevent any water from being introduced to the contents of this container.

STORAGE:
Store product in original container only, away from other pesticides, fertilizers, food or feed.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

RESPIRATORY PROTECTION:
For most conditions, no respiratory protection should be needed; however, use NIOSH/MSHA approved organic vapor respirator as necessary. For concentrations above 1,000 ppm, use air-supplied or self-contained breathing apparatus.

EYE PROTECTION:
Wear OSHA standard chemical splash goggles.

SKIN PROTECTION:
For brief contact, no precautions other than clean body-covering clothing should be need. Use impervious gloves such as neoprene.

9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE:	Clear yellow liquid
ODOR:	Light bland petroleum
pH:	N/A
SPECIFIC GRAVITY	.85-.88
FLASH POINT:	> 200º F
COLOR (GARDNER):	NA
SOLUBILITY IN WATER:	Nil

10. STABILITY AND REACTIVITY

CHEMICAL STABILITY:
Stable at ambient temperatures and atmospheric pressure.

CONDITIONS TO AVOID:
Isolate from oxidizers, heat, and open flame. Isolate from strong oxidizers such as permanganates, chromates and peroxides.

HAZARDOUS DECOMPOSITION:
Carbon monoxide, carbon dioxide from burning.

11. TOXICOLOGICAL INFORMATION

No information available.

12. ECOLOGICAL INFORMATION

No information available.

13. DISPOSAL CONSIDERATIONS

Maximize product recovery for reuse or recycling. Conditions of use may cause this material to become a "Hazardous Waste", as defined by state or federal laws. Use approved treatment, transporters, and disposal sites in compliance with all applicable laws. If spill is introduced into a wastewater treatment system, chemical and biological oxygen demand will likely increase. Spill material is biodegradable if gradually exposed to microorganisms. Potential treatment and disposal methods include land farming, incineration, and land disposal.

14. TRANSPORTATION INFORMATION

DOT SHIPPING DESCRIPTION:
Not regulated

15. REGULATORY INFORMATION

SARA 313 INFORMATION:
This product contains the following substances subject to the reporting requirements of section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372:

Glycol ethers (fraction of product matching EPA definition) < 1.5%

16. OTHER INFORMATION

No specific notes.

DISCLAIMER OF LIABILITY

Chemorse, Ltd. makes no warranty, representation or guarantee as to the accuracy, sufficiency or completeness of the material set forth herein. It is the user's responsibility to determine the safety, toxicity and suitability of his own use, handling and disposal of this product. Since actual use by others is beyond our control; no warranty, expressed or implied, is made by Chemorse, Ltd. as to the effects of such use, the results to be obtained or the safety and toxicity of this product, nor does Chemorse, Ltd. assume liability arising out of the use by others of this product referred to herein. The data in this MSDS relates only to the specific material designated herein and does not relate to use in combination with any other materials or in any process.

Induce Surfactant

Active Ingredient

Alkylaryl Polyoxylkane

INDUCE®

A Nonionic Low Foam Wetter/Spreader Adjuvant

***ACTIVE INGREDIENTS:**

Alkyl Aryl Polyoxylkane ethers, alkanolamides, dimethyl siloxane, and Free Fatty Acids	90.0%
Components ineffective as adjuvant	10.0%
TOTAL	100.0%

Surfactant Content: 70.0%

*All ingredients are accepted for use under CFR 40, 180.

KEEP OUT OF REACH OF CHILDREN

WARNING

See Inside Panel for Additional Precautionary Statements

SN 0107/0711

Protected by U.S. Patent 5,906,961

Manufactured For

HELENA CHEMICAL COMPANY

225 SCHILLING BOULEVARD, SUITE 300 • COLLIERVILLE, TENNESSEE 38017

0PM #110238

PEEL BACK BOOK HERE AND RESEAL AFTER OPENING

NET CONTENTS:

PRECAUTIONARY STATEMENTS
WARNING

BEFORE USING THIS PRODUCT, READ ALL PRECAUTIONS, DIRECTIONS FOR USE, CONDITIONS OF SALE – LIMITED WARRANTY AND LIMITATIONS OF LIABILITY AND REMEDIES.

Formulated product causes eye irritation. Do not get in eyes, on skin, or on clothing. May be harmful if swallowed, inhaled or absorbed through the skin. Avoid breathing vapors or spray mist. In addition, follow precautionary statements on accompanying pesticide(s) label(s).

WHAT TO DO IN CASE OF CONTACT:

IF IN EYES: Immediately flush eyes with clean water for at least 15 minutes. See a physician.

IF SWALLOWED: Give a large amount of water to drink, make person vomit and immediately call a physician. Do not induce vomiting or give anything by mouth to an unconscious person.

IF INHALED: Move victim to fresh air. Give artificial respiration if needed. See a physician.

IF ON SKIN: Remove contaminated clothing and wash skin with soap and water. Call a physician if irritation persists.

If contact is made with the spray solution containing pesticides, follow the "Statement of Practical Treatment/First Aid" on the pesticide(s) label(s).

STORAGE AND DISPOSAL

Store in original container only. Keep container tightly closed, do not allow water to be introduced into the contents of this container. Do not contaminate water sources by runoff from cleaning of equipment, disposal of equipment washwaters or spray waste.

Do not store near heat or open flame.

Do not store with oxidizing agents.

CONTAINER DISPOSAL: Triple rinse (or equivalent) and add rinsate to spray tank, then offer for recycling or reconditioning, or puncture and dispose of according to state and local authorities. If burned, stay out of smoke.

For help in chemical emergencies involving spill, leak, fire, or exposure, call toll free 1-800-424-9300.

GENERAL INFORMATION

INDUCE® is a patent protected blend of nonionic surfactants, deposition agents, humectants, and defoamers. **INDUCE®** incorporates the properties of a wetter/spreader surfactant when used in spray mixtures. **INDUCE®** is designed to quickly wet and spread a more uniform spray deposit over leaf and stem surfaces and improve spray mix deposition. **INDUCE®** can positively affect pesticide spray application and pesticide efficacy. **INDUCE®** is recommended for use with those pesticides whose label recommends a nonionic wetter/spreader-type adjuvant.

DIRECTIONS FOR USE

FOR USE WITH PRODUCTS REGISTERED FOR: AGRICULTURAL, AQUATIC, FORESTRY, INDUSTRIAL, MUNICIPAL, NON-CROPLAND, ORNAMENTAL, RIGHTS-OF-WAY, TURF AND OTHER USES.

The addition of an adjuvant to some pesticides or pesticide tank mix combinations may cause phytotoxicity to the foliage and/or fruit of susceptible crops. Prior to the addition of **INDUCE®** to spray tank mixes, the user or application advisor must have experience with the combination or must have conducted a phytotoxicity trial or must take the recommendations from the labels of the products to be tank mixed.

INDUCE® may be applied by Ground, CDA, Aerial, or Aquatic spray equipment. For most applications, use enough **INDUCE®** to allow for uniform wetting and deposition of the spray onto leaf surfaces without undue runoff.

Ground, Aerial, CDA:	Use 1 - 4 pints per 100 gallons of spray or 0.125 - 0.50% by volume.
Aquatic:	Use 1 - 4 pints per 100 gallons of spray or 0.125 - 0.50% by volume.

***Note:** The above use recommendations are considered to be adequate for most uses. Some pesticides however, may require higher or lower rates for optimum effect. Follow the pesticide(s) label(s) directions when this occurs.

For improved water penetration of hard-to-wet soils and the uniform distribution of applied moisture:

Lawns and Turf: Use **INDUCE®** at .50% v/v concentration.

Greens and Tees: Use **INDUCE®** at .125 - .25% v/v concentration.

Deep Feeding Trees: Use **INDUCE®** at .25 - .50% v/v concentration.

Application of **INDUCE®** through irrigation systems are possible provided that recommended use rates and dilutions are maintained and local, state, and federal guidelines are followed.

MIXING

Prior to any pesticide application all spray mixing and application equipment must be cleaned. Carefully observe all cleaning directions of the pesticide(s) label(s).

Fill spray tank one-half full with water and begin agitation. Add pesticides as directed by labeling or in the following sequence:

1. Dry flowables or water dispersible granules.
2. Wettable powders
3. Flowables
4. Solutions
5. Emulsifiable concentrates

and continue filling. Add **INDUCE®** last and continue agitation.

CONDITIONS OF SALE – LIMITED WARRANTY AND LIMITATIONS OF LIABILITY AND REMEDIES

Read the Conditions of Sale – Warranty and Limitations of Liability and Remedies before using this product. If the terms are not acceptable, return the product, unopened, and the full purchase price will be refunded.

The directions on this label are believed to be reliable and should be followed carefully. Insufficient control of pests and/or injury to the crop to which the product is applied may result from the occurrence of extraordinary or unusual weather conditions or the failure to follow the label directions or good application practices, all of which are beyond the control of Helena Chemical Company (the "Company") or seller. In addition, failure to follow label directions may cause injury to crops, animals, man or the environment. The Company warrants that this product conforms to the chemical description on the label and is reasonably fit for the purpose referred to in the directions for use subject to the factors noted above which are beyond the control of the Company. The Company makes no other warranties or representations of any kind, express or implied, concerning the product, including no implied warranty of merchantability or fitness for any particular purpose, and no such warranty shall be implied by law.

The exclusive remedy against the Company for any cause of action relating to the handling or use of this product shall be limited to, at Helena Chemical Company's election, one of the following:

1. Refund of the purchase price paid by buyer or user for product bought, or
2. Replacement of the product used

To the extent allowed by law, the Company shall not be liable and any and all claims against the Company are waived for special, indirect, incidental, or consequential damages or expense of any nature, including, but not limited to, loss of profits or income. The Company and the seller offer this product and the buyer and user accept it, subject to the foregoing conditions of sale and limitation of warranty, liability and remedies.

A Nonionic Low Foam Wetter/Spreader Adjuvant

***ACTIVE INGREDIENTS:**

Alkyl Aryl Polyoxylkane ethers, alkanolamides, dimethyl siloxane, and Free Fatty Acids	90.0%
Components ineffective as adjuvant	10.0%
TOTAL	100.0%

Surfactant Content: 70.0%

*All ingredients are accepted for use under CFR 40, 180.

KEEP OUT OF REACH OF CHILDREN

WARNING

See Inside Panel for Additional Precautionary Statements

SN 0107/0711

Protected by U.S. Patent 5,906,961

Manufactured For

HELENA CHEMICAL COMPANY

225 SCHILLING BOULEVARD, SUITE 300 • COLLIERVILLE, TENNESSEE 38017

Material Safety Data Sheet

Effective Date: 21-DEC-2010
Product: INDUCE

I. IDENTIFICATION

Chemical Name: MIXTURE OF NONIONIC SURFACTANTS.
Chemical Family: SURFACTANTS
Formula: NOT APPLICABLE, FORMULATED MIXTURE.
Synonyms: NONE
CAS Number: NOT APPLICABLE, FORMULATED MIXTURE.
EPA Number: CAL. REG. NO. 5905-50091

II. PHYSICAL DATA

Boiling Point: >250 DEGREES F.
Freezing Point: <40 DEGREES F.
Spec Gravity: .9975 GMS/CC
Vapor Pressure: NOT ESTABLISHED
Vapor Density: 2.1
Solubility: DISPERSIBLE
Volatiles: 8 - 10%
Evaporation: NOT APPLICABLE
Melting Point: NOT APPLICABLE
Appearance: YELLOW LIQUID, ALCOHOL ODOR.

III. INGREDIENTS

Material	CAS Number	Percent	TLV	Hazard
PROPRIETARY BLEND OF ALKYL ARYL POLYOXYLKANE ETHER, AND FREE FATTY ACIDS		90.00	150 MG/M3	MODERATE SKIN & EYE IRRITANT
WATER AND FORMULATION AIDS		10.00	N/E	NONHAZARDOUS

IV. FIRE AND EXPLOSION HAZARD

Flash Point: >200 DEGREES F.
Autoignition Temp: >750 DEGREES F.
Flammable Limit: NOT APPLICABLE
Extinguishing Media: DRY CHEMICAL, WATER SPRAY, WATER FOG, CARBON DIOXIDE, FOAM, OR SAND/EARTH.
Special Fire Fight Proc: FIRE FIGHTERS MUST BE EQUIPPED TO PREVENT BREATHING OF VAPORS OR PRODUCTS OF COMBUSTION. WEAR AN APPROVED SELF-CONTAINED BREATHING APPARATUS AND PROTECTIVE CLOTHING.
Fire and Expl Hazard: WATER SPRAY MAY BE INEFFECTIVE. COOL FIRE-EXPOSED CONTAINERS WITH WATER. FOG NOZZLES ARE

Material Safety Data Sheet

Effective Date: 21-DEC-2010
Product: INDUCE

PREFERABLE. CLOSED CONTAINERS MAY RUPTURE/EXPLODE WHEN EXPOSED TO EXTREME HEAT.

V. HEALTH HAZARD

Carcinogen Information: NONE CURRENTLY KNOWN.

ACUTE EFFECTS OF OVER EXPOSURE

Swallowing:	THE ACUTE ORAL LD50 (MALE RAT) = >5,010 MG/KG. MAY CAUSE GASTROINTESTINAL IRRITATION, NAUSEA, VOMITING AND DIARRHEA.
Skin Absorption:	THE ACUTE DERMAL LD50 (RABBIT) = >2,010 MG/KG.
Inhalation:	EXPOSURE MAY CAUSE NASAL AND RESPIRATORY IRRITATION.
Skin contact:	MAY CAUSE IRRITATION AFTER REPEATED EXPOSURE, DEFATTING AND DERMATITIS. PRODUCT CONSIDERED A MODERATE SKIN IRRITANT.
Eye Contact:	MAY CAUSE SEVERE EYE IRRITATION IN UNWASHED EYES. PRODUCT CONSIDERED A MODERATE EYE IRRITANT.
Chronic Effects:	NONE CURRENTLY KNOWN.
Other Hazard:	MILD IRRITATION OF EYES AND NOSE OCCURS AT VERY HIGH CONCENTRATIONS. THE LIQUID CAN DEFAT THE SKIN, PRODUCING A DERMATITIS CHARACTERIZED BY DRYING AND FISSURING.

EMERGENCY AND FIRST AID PROCEDURES

Swallowing:	GIVE 1 TO 2 GLASSES OF WATER TO DRINK AND INDUCE VOMITING BY INSERTING FINGER TO BACK OF THROAT. OBTAIN MEDICAL ATTENTION IMMEDIATELY.
Skin:	WASH SKIN THOROUGHLY WITH SOAP AND WATER. IF IRRITATION DEVELOPS, CONSULT A PHYSICIAN. LAUNDER CLOTHING BEFORE REUSE.
Inhalation:	REMOVE TO FRESH AIR. IF BREATHING IS DIFFICULT, GIVE OXYGEN AND CALL A PHYSICIAN IMMEDIATELY.
Eyes:	FLUSH EYES WITH WATER FOR 15 MINUTES, HOLDING EYELIDS OPEN. IF IRRITATION PERSISTS, CALL A PHYSICIAN.
Notes to Physician:	IN THE EVENT OF AN ADVERSE RESPONSE, TREATMENT SHOULD BE DIRECTED TOWARD CONTROL OF THE SYMPTOMS.

VI. REACTIVITY

Material Safety Data Sheet

Effective Date: 21-DEC-2010
Product: INDUCE

Stability:	Stable
Conditions to Avoid:	EXCESSIVE HEAT AND OPEN FLAMES.
Polymerization:	Will Not Occur
Conditions to Avoid:	NONE CURRENTLY KNOWN.
Incompatibility material:	AVOID CONTACT WITH STRONG OXIDIZERS SUCH AS HYDROGEN PEROXIDE, BROMINE, AND CHROMIC ACID.
Hazardous Combustion:	CARBON MONOXIDE AND CARBON DIOXIDE UNDER FIRE CONDITIONS.

VII. SPILL OR LEAK PROCEDURES

Spill or Leak Proc:	ABSORB WITH AN INERT MATERIAL SUCH AS SAND, SOIL OR VERMICULITE. SWEEP UP AND DISPOSE OF IN ACCORDANCE WITH FEDERAL, STATE, AND LOCAL REGULATIONS.
Waste Disposal Method:	THIS MATERIAL MUST BE DISPOSED OF ACCORDING TO FEDERAL, STATE, OR LOCAL PROCEDURES UNDER THE RESOURCE CONSERVATION AND RECOVERY ACT.

VIII. SPECIAL PROTECTION INFORMATION

Respiration:	USE NIOSH/MSHA CERTIFIED RESPIRATOR WITH ORGANIC VAPOR CARTRIDGE IF CONCENTRATION EXCEEDS PERMISSIBLE EXPOSURE LIMITS.
Ventilation:	MECHANICAL EXHAUST SYSTEM.
Gloves:	IMPERVIOUS
Eyes:	CHEMICAL WORKERS GOGGLES.
Other:	EYE WASH STATION, IMPERVIOUS APRON AND FOOTWEAR.

IX. SPECIAL PRECAUTIONS

Special precaution:	KEEP OUT OF REACH OF CHILDREN. DO NOT STORE WITH FOOD, FEED, OR OTHER MATERIAL TO BE USED OR CONSUMED BY HUMANS OR ANIMALS. DO NOT CONTAMINATE WATER SUPPLIES, LAKES, STREAMS, OR PONDS. KEEP CONTAINERS TIGHTLY CLOSED. KEEP AWAY FROM HEAT, SPARKS OR FLAMES. STORE BETWEEN 40 DEGREES F AND 120 DEGREES F.
Other precaution:	THIS PRODUCT DOES NOT CONTAIN ANY CHEMICAL SUBJECT TO THE REPORTING REQUIREMENTS OF SECTION 313 OF TITLE III OF THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT OF 1986 AND 40 CFR PART 372.

Material Safety Data Sheet

Effective Date: 21-DEC-2010
Product: INDUCE

X. SHIPPING INFORMATION

Shipping name: NOT REGULATED BY DOT IN LESS THAN BULK PACKAGES. SEE TRANSPORTATION NOTE.
Hazard Class: NONE
Identification No: NONE
Labels Required: NONE REQUIRED
Placarding: NONE REQUIRED
Freight Class: ADJUVANT, SPREADER OR STICKER, LIQUID, NOIBN

Chemical Name	Equivalent R.Q.
NOT APPLICABLE	NOT APPLICABLE

TRANSPORTATION NOTE:
DOT: IF SHIPPED IN BULK PACKAGES, SHIP AS:
UN3082, ENVIRONMENTALLY HAZARDOUS SUBSTANCES, LIQUID, N.O.S. (ALCOHOL C-12 - C-16 POLY (1-6) ETHOXYLATE), 9, PG III, MARINE POLLUTANT "ERG 171"
AIR/WATER: IF SHIPPED IN ANY SIZE PACKAGE BY AIR OR WATER, SHIP AS:
UN3082, ENVIRONMENTALLY HAZARDOUS SUBSTANCES, LIQUID, N.O.S. (ALCOHOL C-12 - C-16 POLY (1-6) ETHOXYLATE), 9, PG III, MARINE POLLUTANT "ERG 171"

XI. GENERAL PRODUCT INFORMATION

National Fire Protection Association Rating:
(Rating level: 4-Extreme, 3-High, 2-Moderate, 1-Slight, 0-Minimum

Health: 1 Fire: 1 Reactivity: 0

S.A.R.A. Title III Hazard Classification: (Yes/No)

Immediate (Acute) Health: Y Delayed (Chronic) Health: N
Sudden Release of pressure: N Fire: N
Reactive: N

41-A Drift Retardant

Active Ingredient

Polyacrylamide

41-A©

DROPLET SIZE CONTROL

DESCRIPTION:

41-A is a dry-flowable ***drift retardant/deposition aid*** for use in both ground and aerial application of pesticides. **41-A** reduces drift by materially reducing the fines normally generated by nozzle and wind shear. **41-A** has been tested and approved by the leading applicators in the country.

Significant advantages of **41-A**:

- *Patented Formulation*
- *"Zero Residue" Proven*
- *Longest Shelf-life*
- *No Residue Allows Easy Disposal of Container*

REGISTRATIONS: CALIF. REG. NO. 2839-50021-AA EPA EST. NO. 2839-CA-1

APPEARANCE: White odorless granular polymer mixture

ACTIVES : 27% Polyacrylamide Polymer; 3% Polysaccharide Polymer

SHELF-LIFE: 18 months minimum in unopened container

DIRECTIONS:

41-A may be used with all water-emulsifiable pesticides. To insure complete and rapid hydration of **41-A**, the materials added to the spray mix water must always be in the following order:

1) **41-A**
2) Wettable Powders
3) Other Additives (Surfactants, Spreader-stickers, etc.)
4) Liquid Pesticides

Do not pour **41-A** directly from the bottle into the mix tank or hopper. It is recommended that the desired amount of **41-A** be poured into a dry measuring cup or similar container, then sprinkled on top of the mix. This should be done as the mix water is entering the tank or hopper, or while the circulating pump is running. Circulation should be continuous until application is complete.

DILUTION RATIOS:

Suggested label concentrations are intended as guidelines only and are based upon the assumption that influencing factors such as wind speed, boom height, aircraft speed, temperature, and thermal inversion conditions are within the scope of recommended practice.

AERIAL APPLICATIONS 2 - 5 oz/100 gallons

GROUND RIG OPERATIONS 1.5 - 6 oz/100 gallons

41-A is effective at concentrations as low as 1.5 ounces per one hundred gallons (minimum adverse conditions) and as high as 10 ounces per one hundred gallons (very severe conditions).

HEALTH & SAFETY: See product label and Material Safety Data Sheet for specific information.

ITEM NO.: 7007 08/98

SANAG®
3959 Goodwin Avenue • Los Angeles, CA 90039-1187 • (323)245-6781

MATERIAL SAFETY DATA SHEET
41-A DRIFT CONTROL AGENT

SANITEK PRODUCTS, INC.
3959 Goodwin Avenue
Los Angeles, CA 90039

REVISION DATE: 10/10/2013

EMERGENCY PHONE NUMBERS: SANITEK (323) 245-6781 **CHEMTEL, INC. (800) 255-3924**

LEGEND: NE = Not established N/A = Not available

CALIF. REG. NO.: 2839-50021-AA **EPA EST. NO.: 2839-CA-1**

SECTION 1 PRODUCT IDENTIFICATION

PRODUCT NAME: 41-A **PRODUCT CODE:** 7007
CHEMICAL NAME: N/A

NFPA HAZARD RATING:	**HEALTH: 1**	**FIRE: 1**	**REACTIVITY: 0**	**SPECIAL: NONE**	
HAZARD SCALE:	**MINIMAL 0**	**SLIGHT 1**	**MODERATE 2**	**SERIOUS 3**	**SEVERE 4**

SECTION 2 INGREDIENT COMPOSITION / INFORMATION

COMPONENTS	CAS NUMBER	PEL (TWA)	TLV
Product may generate nuisance dust	N/A	15 mg/M^3	10 mg/M^3
POLYACRYLAMIDE POLYMER	N/A	NE	NE
POLYSACCHARIDE POLYMER	11138-88-2	15 mg/M^3	NE
SODIUMTRIPOLYPHOSHATE	7758-29-4	5 mg/M^3	NE

SECTION 3 HEALTH AND HAZARD DATA

ALL INGREDIENTS ARE LISTED ON US EPA TSCA INVENTORY

OSHA, NTP, & IARC CARCINOGEN STATUS: Not listed

CALIF. PROP. 65: Product contains trace levels of acrylamide which is known to the State of California to cause cancer and birth defects or other reproductive harm.

PRIMARY ROUTES OF EXPOSURE: Eyes, skin, and respiratory tract

EFFECTS OF OVEREXPOSURE:

- **INHALATION:** Dust may irritate respiratory tract.
- **EYE CONTACT:** Dust may produce mild eye irritation
- **SKIN CONTACT:** May cause irritation, especially after repeated or prolonged contact.
- **SWALLOWED:** May cause discomfort / gastrointestinal disturbance. Due to hydroscopic properties, can form paste or gel in airway.

FIRST AID PROCEDURES:

- **INHALATION:** Remove person to fresh air. If breathing is difficult,get medical attention.
- **EYE CONTACT:** Immediately flush eyes with lot of running water for 15 minutes, lifting the upper and lower eyelids occasionally. Get prompt medical attention for additional treatment
- **SKIN CONTACT:** Wash with soap and water. Remove contaminated clothing and footwear; launder before reuse. If irritation persists, get medical attention.
- **SWALLOWED:** Do Not induce vomiting. Rinse mouth with water. Immediate first aid is not likely to be required. A physician or Poison Control Center can be contacted for advice.

ACUTE HEALTH EFFECTS: See Overexposure effects above.
CHRONIC HEALTH EFFECTS: None expected
MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Pre-existing disorders of skin or eyes.
SARA HAZARD CATEGORY: Acute

MATERIAL SAFETY DATA SHEET
41-A DRIFT CONTROL AGENT

SECTION 4 FIRE AND EXPLOSION HAZARDS

FLASH POINT (deg F): None **METHOD USED:** N/A
FLAMMABLE LIMITS IN AIR: NE **AUTOINGNITION TEMP:** NE
EXTINGUISHING MEDIA: Water fog, dry chemical, foam, or CO_2
SPECIAL FIREFIGHTING PROCEDURES: Adding water to product produces extremely slippery surfaces or conditions.
UNUSUAL FIRE / EXPLOSION HAZARDS: Product can burn if ignited.

SECTION 5 SPILL, LEAK, AND WASTE PROCEDURES

SPILL RESPONSE: If possible, complete cleanup on a dry basis as addition of water makes surfaces extremely slippery. Sweep, scoop, or vaccum up all spilled material, contaminated soil, and other contaminated material and place in containers. After all practical dry cleanup has been done, residual contamination can be flushed with plenty of water.
WASTE DISPOSAL METHODS: Dispose of contaminated product and materials used in cleaning up spills or leaks in a manner approved for this material. Consult appropriate Federal, State, and Local regulatory agencies for proper disposal procedures. Not a hazardous waste.
DISPOSAL OF EMPTY CONTAINERS: After triple-rinsing containers, recondition or dispose of in manner consistent with applicable regulations.

SECTION 6 SPECIAL PROTECTION DATA

VENTILATION: Use in well-ventilated area.
RESPIRATORY: Not required under normal use conditions.
EYES: Safety glasses if contact with eyes could occur.
GLOVES: Rubber gloves if hand immersion is required.
OTHER: None

SECTION 7 SPECIAL PRECAUTIONS

HANDLING AND STORAGE: DO NOT TRANSFER MATERIAL TO UNLABELLED INTERMEDIATE CONTAINERS. Store away from heat and flames. Keep container closed. Product is slighly hygroscopic and should be stored in a dry area to prevent moisture pickup and caking

SECTION 8 PHYSICAL DATA

BOILING POINT (deg F): N/A **% VOLATILES:** Negligible
VAPOR PRESSURE (mm Hg): N/A **WATER SOLUBILITY:** Miscible
SPECIFIC GRAVITY: NE **pH @ 20 deg F:** N/A
WATER REACTIVITY: None **EVAP. RATE (H20=1):** N/A
DESCRIPTION: White granular solid

SECTION 9 REACTIVITY DATA

STABILITY: Stable **HAZARDOUS POLYMERIZATION:** None
CONDITIONS TO AVOID: Sparks and open flames
INCOMPATABILITY: Strong oxidizers
HAZARDOUS DECOMPOSITION PRODUCTS: Oxides of carbon, nitrogen, and phosphorus

MATERIAL SAFETY DATA SHEET
41-A DRIFT CONTROL AGENT

SECTION 10 ECOLOGICAL INFORMATION

PERSISTENCE AND DEGRADABILITY: **Not readily biodegradable.**

FOR POLYACRYLAMIDE:

FISH:	**LC50 / Danio rerio (Zebra fish) / 96h: > 100 mg/L (OECD 203)**
ALGAE:	**IC50 / Scenedesmus subspicatus (Green algae) / 72h: > 100 mg/L (OECD 201)**
DAPHNIA:	**LC50 / Daphnia magna (Water flea) / 48h: > 100 mg/L (OECD 202)**

FOR POLYSACCHARIDE;

FISH:	**LC50 / Rainbow trout / 96h: 490 mg/L**
ALGAE:	**IC50 / Scenedesmus subspicatus (Green algae) / 72h > 100 mg/L (OECD 201)**
DAPHNIA:	**LC50 / Daphnia magna (Water flea) / 48h: 980 mg/L**

SECTION 11 SHIPPING AND LABELLING DATA

DOT HAZARD CLASSIFICATION: **Not regulated**
PROPER DOT SHIPPING NAME: **Adjuvant, dry**

VEGETATION MANAGEMENT PLAN

FOR

VERMONT ELECTRIC COOPERATIVE, INC.

TRANSMISSION AND DISTRIBUTION SYSTEMS

AUGUST 2005
Revised March 2009
Revised March 2014

PREPARED BY:

Sara L. Packer, CF
Manager of Forestry
Vermont Electric Cooperative, Inc.
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Licensed in New Hampshire #350
Society of American Foresters, Certified #1175

TABLE OF CONTENTS

INTRODUCTION

Vermont Electric Cooperative, Inc. (VEC), a member-owned electric distribution cooperative, is the second largest electric utility in the state of Vermont in terms of meter count and land area covered. VEC serves approximately 34,000 households and businesses in seventy-four towns in northern Vermont. With a predominantly rural residential customer base, VEC also serves agricultural, commercial, industrial and limited urban residential members. The service area encompasses approximately 2,717 miles of electric distribution lines (+/- 2,442 miles of overhead) and 157 miles of overhead transmission lines. VEC's mission is to provide energy and other appropriate services to its members.

A twelve-member Board of Directors is elected by members to represent geographically-based districts. The board sets policy and provides general direction for VEC's operations, which are overseen by the Chief Executive Officer (CEO). The company is structured with many specialized technical and service departments designed to support one another, such as Power Supply; Member Service; Metering; Human Resources; Accounting; Information Technologies; and Operations - Transmission and Distribution, Substation Metering, System Operations, Mapping, Engineering, Scheduling and Vegetation Management.

LOCATION

Headquartered in Johnson, Vermont, with additional Service Centers in Newport, Grand Isle and Richford, VEC's service area encompasses the majority of Northern Vermont. VEC's territory stretches across Caledonia, Chittenden, Essex, Franklin, Grand Isle, Lamoille and Orleans Counties. (See Appendix A - VEC Service Territory Map)

OWNERSHIP HISTORY

VEC was founded in 1938 in Eden Mills, Vermont to serve residents in parts of rural Lamoille County who had been bypassed by investor-owned utilities. Initially, VEC serviced 155 homes in Eden and Lowell. Before long, neighboring farms, homes and businesses were added and membership grew to 2,440 by 1950. Early service extensions continued into Chittenden and Franklin Counties. From the 1940's until the 1960's, the service territory continued to expand in Northern Vermont through the construction of new lines and the acquisition of small private companies. In 1969, VEC expanded into Southern Vermont through a merger with Halifax Electric Cooperative (this service territory was subsequently sold to Central Vermont Public Service in 2006). In 1970, VEC acquired the International Electric Company serving the Derby Line area located along the Canadian border. In April of 2004, VEC completed the acquisition of Citizens Communication Company's Vermont Electric Division (hereinafter referred to as Citizens), more than doubling the membership-base.

MAINTENANCE CYCLE

VEC has a target of attaining a five-year vegetation maintenance cycle on transmission rights-of-way and an eight-year maintenance cycle on distribution rights-of-way. Transmission and distribution line scheduling units have been identified and a long-range plan has been developed to attain these cycles. A five-year cycle on transmission lines was attained in 2012 (See Appendix B – VEC Transmission System Vegetation Management Treatment Schedule). Development of a detailed Distribution System Vegetation Maintenance Treatment Schedule took place in 2009 and implementation is underway with a goal of taking a cycle and a half (12

years) to achieve the target eight-year cycle (See Appendix C – VEC Distribution System Vegetation Management Treatment Schedule). Vegetation management funding has increased from $1,000,000.00 in 2005 to $2,508,000.00 in 2014 with an additional $450,000.00 of budgeted spending, dependent upon cost contributions from Fairpoint Communications. Vegetation Management funding will continue to be adjusted appropriately as long range plans are implemented to attain and maintain target cycles on transmission and distribution systems .

STATEMENT OF PURPOSE

VEC has a responsibility to maintain vegetation so as not to threaten the safety and integrity of their overhead electric facilities. It is the intent of VEC to develop and implement a long-term, comprehensive vegetation management program designed to meet the goals and objectives of the Cooperative, as well as the requirements of the Public Service Board, as they both relate to electric utility right-of-way maintenance.

GOALS AND OBJECTIVES

The primary goal of the vegetative management program is to develop an environment-friendly approach to vegetation management designed to improve reliability, provide for safe and efficient operation and maintenance of distribution and transmission systems, maximize cost-effectiveness and enhance member satisfaction. Key indicators of success include the reduction of vegetation-related safety hazards and service interruptions, as well as a reduction in tree related service orders.

Specific objectives include

- minimization of safety hazards for landowners, workers and users of land along and/or adjacent to VEC's utility rights-of-way.
- protection of all material and equipment utilized to transmit and distribute power
- removal and/or control of undesirable species
- retention, encouragement and maintenance of healthy low growing vegetation compatible with utility lines
- ongoing collection of data on vegetation quantities and characteristics
- utilization of a professionally trained work force
- minimization of soil erosion
- minimization of impacts to wetlands
- maintenance and promotion of favorable wildlife populations
- consideration of aesthetic impacts
- sensitivity to the concerns of property owners
- promotion of conditions compatible with landowner and other acceptable joint uses
- consideration of invasive exotic vegetation
- minimization of impacts to rare, threatened and endangered species

VEC is committed to developing and implementing a financially and ecologically-sustainable vegetation management program and will continue to pursue and evaluate new technologies and techniques to facilitate meeting the above goals and objectives.

GUIDING PRINCIPLES

VEC's vegetation management program is based on the following basic principles, as published in the National Rural Electric Cooperative Association (NRECA) Cooperative Research Network's (CRN) Vegetation Management Manual.

1. Cost effective vegetation management requires a long-term, consistent approach.

VEC is committed to providing consistent vegetation management personnel and funding. Vegetation management is no longer simply incorporated into other line maintenance activities and/or overseen by line department personnel with competing responsibilities. VEC's vegetation management program is administered by a professional forestry staff with a dedicated annual budget.

2. Proactive vegetation management operations are more efficient and effective than reactive operations.

An International Society of Arboriculture (ISA) study, The Economic Impacts of Deferring Electric Utility Tree Maintenance,[1] found that deferring maintenance beyond an optimum cycle length causes a marked increase in pruning costs per tree. The cost jump is a result of the increased number and size of branches and trees that must be removed, handled, and disposed of, and the increased difficulty associated with safely removing branches and trees that have grown into, through, or beyond the conductors. The implication is that pruning or removing trees whose maintenance has been deferred reduces the effectiveness of maintenance dollars, which results in the deferral of maintenance elsewhere on the system, thus compounding the problem.[2]

VEC's forestry staff continually works to improve management processes used to assess and prioritize vegetation maintenance needs in order to facilitate a preventative maintenance strategy. While there will always be a need for some level of unplanned vegetation maintenance to address danger tree removals and hot spots, separate contracts are awarded for this type of work in an effort to limit the impact on scheduled maintenance activities and allow for completing routine maintenance systematically and on the desired cycle.

3. Proper arboricultural practices are essential to minimizing costs and maximizing the effectiveness of tree maintenance operations.

VEC's Vegetation maintenance activities are conducted by Qualified Line Clearance Contractors who are bound by contract to adhere to the American National Standards Institute (ANSI) Std. A300, "Tree, Shrub, and Other Woody Plant Maintenance-Standard Practices", and other established and widely accepted pruning guidelines such as those presented in The Society of Arboriculture's "Best Management Practices Utility Pruning of Trees" and/or Dr. Alex Shigo's booklet titled "Pruning Trees Near Electric Utility Lines", as well as "VEC's Specifications for Vegetation Management on Transmission and Distribution Systems" (See Appendix D – VEC

[1] Browning, D.M. and H.V. Wiant "The Economic Impacts of Deferring Electric Utility Tree Maintenance," Journal of Arboriculture, Vol. 23, No. 3, May 1997; Arborist News, Vol. 6, No. 2, April 1997; and Utility Arborist Association Quarterly, Vol. 5, No. 3, Spring 1997.

[2] Browning, D.M. "The High Cost of Deferred Maintenance," Vegetation Management Manual, National Rural Electric Cooperative Association (NRECA), Cooperative Research Network (CRN), 2003.

Vegetation Management Specifications). VEC's Forestry staff conducts routine maintenance inspections and contract administration to ensure that maintenance activities are conducted in accordance with established standards (See Appendix E – VEC Vegetation Management Field Inspection Report).

4. Programs based on Integrated Vegetation Management (IVM) techniques are both the most efficient and environmentally sound.

Following a thorough review and evaluation of the benefits of an Integrated Vegetation Management (IVM) strategy, VEC introduced the selective use of herbicides to control vegetation along approximately 20 miles of transmission line and 30 miles of distribution line in 2009. Since 2009, herbicide application has been expanded, where appropriate, on the remainder of VEC's transmission and distribution systems.

5. Proper record keeping and productivity measurement are critical to long-term success.

VEC's Forestry staff has worked closely with Information Technology (IT) to develop a comprehensive record-keeping and reporting system. Detailed information regarding maintenance activities and costs are entered into an access database and vegetation management activities are scheduled and tracked utilizing Clearion Mobile Software, a full featured, map-based data collection and editing application designed for use by mobile workforces like those of utility vegetation management programs. VEC's forestry staff is able to create, share, track and audit map-based vegetation control information. These applications have and will continue to facilitate a significant gain in efficiencies within the vegetation management program and provide continuous, long-term information to assist in justification of management decisions, annual forecasting and budgeting, prioritizing and scheduling workloads, monitoring crew productivity and determining the most cost-effective vegetation maintenance methods.

6. Professional supervision and sufficient technical expertise are essential to ensuring that a program is successful and cost-effective.

VEC's Forestry staff includes a SAF (Society of American Foresters) Certified Forester and an ISA (International Society of Arboriculture) Certified Arborist.

HISTORY OF RIGHT-OF-WAY MANAGEMENT

The history of VEC's right-of-way management is related to land use, electric power demand and previous electric utility right-of-way maintenance policies. This information was gathered based on review of records and interviews with employees.

In the early years of VEC, much of Vermont was pastured or open land, where placement of off-road utility lines did not represent any significant right-of-way maintenance obstacles. This was especially true near the many small farming communities where power was needed. The vegetation maintenance needs of these early lines was minimal, with the majority of cutting being focused on hedgerows and scattered tree growth that pastured animals found undesirable. Over time, as land use patterns changed, much of the pasture land was left idle and reverted back to woodland, resulting in a greater need for right-of-way maintenance.

Beginning in the late 1940's, maintenance activities included both hand cutting and chemical treatments. Although this work was commonly contracted out, there was a period of time during the 1970's when VEC employed in-house tree trimming and herbicide spray crews. Before long,

it became too expensive to maintain these crews through the winter and they were replaced with outside contractors. As a result of some individuals wanting to avoid the use of herbicides on their property, there were also brush control agreements in place to allow some lines to be owner-maintained, but in many cases, these lines were never actually maintained by the owners.

As chemical treatments became less popular with the public, the use of herbicides ended in the late 1980's. Since that time, while limited vegetation maintenance is conducted by VEC linemen, the majority of right-of-way maintenance is done by professionally trained, qualified line clearance contractors.

With the exception of a few years in the mid to late 1980's, when funding was not available, VEC has had an active right-of-way maintenance program since the 1940's. In the mid to late 1970's, the use of coated wire became more common, resulting in a decrease in required clearances, but continued routine right-of-way maintenance. Historically, much of the maintenance was on an as-needed basis and there was not always an established cycle. In recent years, the target was a ten year cycle. The program was administered by the Line Superintendent, with the help of the Line Worker Group Leaders in the various districts. Maintenance activities were tracked on a set of paper maps, and staking sheets were prepared identifying pole numbers, span lengths and footage cleared.

In general, the rights-of-way for the former VEC stand-alone system have been routinely maintained. While there are definitely lines in need of maintenance, the majority of the system is in adequate to good condition.

While the former Citizens' rights-of-way are also located in rural areas that are most commonly old agricultural land, many of these lines are located on roadsides. These rights-of-way include fewer long off-road spans, but are often still very heavily wooded with roadside forests and hedgerows.

Unlike the VEC rights-of-way, there is no known history of the use of herbicides on these lines and the maintenance program did not follow an established maintenance cycle until more recent years, when an approximate 7-year cycle was the target for the transmission lines. The transmission system was identified as a top priority and beginning in the early 1980's, the system was viewed from the air via helicopter at least once a year to identify mechanical faults and trimming needs, with additional flights following large storms. Key distribution lines, especially off-road systems, were also viewed during these flights. In 1999, Central Vermont Public Service's (CVPS) Forestry Department was hired to implement vegetation management on the Citizens' transmission rights-of-way. This maintenance included both hand cutting and mowing activities and took place annually from 1999 to 2002. While records for this work have been obtained from CVPS, no vegetation management records were passed along in the transaction from Citizens to VEC. Most of Citizens transmission lines were sold to VELCO prior to the sale of the remainder of its system to VEC.

Many of the Citizens' distribution lines were converted to coated wire (or tree wire), and vegetation maintenance was conducted on an as needed basis. Some degree of tree maintenance took place each year (with the exception of a few years in the late 70's to early 80's when

funding was not available) in locations identified by the Linemen District Representatives as being trouble spots. Similar to VEC, this work was predominantly conducted by contracted tree services, with limited tree maintenance being done by the line workers.

RIGHT-OF-WAY OWNERSHIP/EASEMENTS

Lands within the VEC rights-of-way are either owned by private individuals or are in State or Federal ownership. A perpetual easement is the most common type of utility right-of-way document. While such documents exist for all rights-of-way within the former VEC standalone system, they do not appear to exist for all former Citizens' rights-of-way.

Most former VEC easements provide for cutting and trimming of all trees and shrubbery to the extent necessary as determined by VEC to keep the utility lines clear, including removal of all dead, weak, leaning or dangerous trees which are tall enough to strike the wire in the event such trees should fall. Some of the easements also have more specific details hand written, regarding the allowed activities within the right-of-way.

The easements also include restrictions on what landowners can do within the right-of-way. They are not permitted to erect structures of any kind within 25 feet of the pole line, to place obstructions of any kind within the right-of-way or to change the grade of the right-of-way without the prior written consent of VEC.

The physical descriptions of the former VEC rights-of-way vary. Older easements do not have any specified width, while some specify a 30 foot width and most recently, a 50 foot width. The widest easement to date is 50 feet on both transmission and distribution lines.

Where they exist, older former Citizens' easements provide for cutting down or trimming any trees necessary in the opinion of the Company to give proper clearance for the utility line. Similar to the older former VEC easements, the width of the right-of-way is not always specified for distribution lines. More recent former Citizens' distribution line easements provide for clearing and keeping cleared a strip along the utility line not exceeding 20 feet in width. Restrictions in these easements prohibit land owners from erecting buildings or any other structures; planting trees or bushes; and changing grade, fill or excavation if, in the judgment of the Company, such activities might interfere with the proper operation and maintenance of the utility lines. The following uses are forbidden within the right-of-way: swimming pools, tennis courts, any building or other structure, unregistered vehicle parking or storage of any materials or equipment. Former Citizens' transmission line easements are generally 100 feet in width.

VEC's primary strategy for addressing the lack of recorded easements in some areas is to require that line clearance contractors conduct advanced notification of vegetation maintenance activities. Detailed member notifications (See Appendix D, Exhibit 3) – VEC Member Notification Hang Tags) have been developed to clearly explain scheduled vegetation maintenance activities and provide contact information for members with questions and/or concerns.

Standard easements for new VEC rights-of-way are a minimum of 50 feet in width for distribution lines and 100 feet in width for transmission lines (See Appendix F- VEC Overhead Utility Easement Template).

SURROUNDING LAND USE PATTERNS

Land use patterns are varied among VEC's rights-of-way. Residential land use covers a wide range of situations, including individual homes on large acreages, developments and condominiums, small villages and large towns. Many VEC rights-of-way pass through agricultural land including cash crops such as alfalfa, corn, potatoes, soy beans, oats, pumpkins, apples, strawberries, blueberries and grapes, as well as dairy, beef cattle, sheep, goat, horse, veal and poultry farms. Recreational uses along VEC rights-of-way are very prevalent and include hunting, fishing, skiing, snow shoeing, bird watching, snowmobiling, horse-back riding, hiking, berry picking and camping. Industrial land use is located near the larger towns and includes the forest products industry, electronics, military equipment manufacturing, grain processing, tool manufacturing and many other Vermont manufacturing and processing industries. The wooded areas among VEC rights-of-way are frequently actively managed forests ranging from backyard woodlots to Christmas tree farms to timber investment properties to sugar bushes utilized for maple syrup production.

While VEC's transmission and distribution systems pass through areas utilized for many varied land uses, they are all clearly connected to Vermont's rural way of life. It is the land use patterns of VEC's members that serve as the foundation for Vermont's rural economy and VEC is privileged to provide these members reliable electric service. Through the use of proper vegetation management techniques, VEC will continue to promote conditions compatible with Vermont's land use patterns.

PHYSICAL DESCRIPTION OF VEC RIGHTS-OF-WAY

VEC transmission and distribution lines traverse many types of landforms, which are predominantly located in rural wooded areas. While much of the former Citizens' lines are located along roadsides, a large portion of the former VEC lines are off-road.

VEC rights-of-way pass over and are located in close proximity to many mountains, lakes, ponds and rivers across Vermont. The most noteworthy mountains are Mount Mansfield, Jay Peak and Brousseau Mountain. Significant lakes in close proximity include Lake Champlain, Lake Memphramagog, Lake Carmi, Fairfield Pond, Lake Seymour, Island Pond, Norton Pond, Big Averill Lake, Maidstone Lake, Lake Salem, Lake Iroquois and Derby Pond. Major rivers near VEC rights-of-way include the Missisquoi, Black, Lamoille, Coaticook and Winooski Rivers.

VEC's rights-of-way cross varied terrain, from low, flat farmland used for crops or pasture to gentle rolling hills to steep, rugged mountainous terrain. Side slopes and hidden gullies are commonly found in VEC rights-of-way, as are frequent rock outcroppings and areas of ledge. Dense ferns, berry bushes, tree sprouts and advanced regeneration often conceal holes, rocks and ditches. Traversing the rights-of-way can be a difficult and hazardous task.

VEGETATION/FOREST TYPES

A variety of vegetation is present along VEC rights-of-way, ranging from open agricultural land (growing various crops), low-growing shrubs and brush, as well as fully grown trees. Tree growth rates vary widely and depend on a number of factors, such as aspect of slope, moisture, sunlight, competition, seed source and soil makeup.

Groups of tree species present in any given location are generally related to the elevation, site and climate of the specific area. The most common forest types in wooded areas along VEC rights-of-way are Northern hardwoods, Spruce-fir, Eastern hemlock-Yellow birch and White pine. Components of individual species within these types vary from location to location and several of these types often overlap, resulting in what is often referred to as a mixed wood forest.

In addition to these forest cover types, there are also individual stands of Northern white cedar, Red pine, Norway spruce and White spruce along some VEC rights-of-way. The cedar often occurs on the lower portions of abandoned pasture and the Red pine and Spruce are typically plantations. Less common species often found in residential areas include Willow and Lombardi Poplar.

Northern hardwoods and hardwood dominated mixed woods are most commonly present on low to mid slopes. These are the predominant forest cover types that the VEC rights-of-way cross through. Primary species are Sugar Maple, American Beech and Yellow birch. Associated species include Red maple, White birch, Black cherry, White ash, Eastern hophornbeam, Red Spruce and Balsam fir. Lesser components of American Basswood, Butternut, Red Oak, Quaking aspen, Balsam Poplar, American elm, White Pine and Eastern hemlock are also present in some locations (site dependent). The trees in these forest types are generally moderate to fast growing and can be quite difficult to control.

Areas which have experienced significant soil disturbance and/or increase in sunlight will generally regenerate with tree species that are shade intolerant and thrive in the sunlight. These are known as pioneer species and are aggressive and fast growing, including species such as Pin Cherry, Grey birch, White Birch and Poplar. These early successional species tend to be shorter lived and will eventually be replaced by the Beech- Birch- Maple forest described above.

Spruce-fir forests occur on the well-drained to excessively well drained upper mountain slopes characterized by steepness, rockiness and shallow soils, as well as on the imperfectly to moderately drained flats, low ridges and knolls, continuing to the base of the lower mountain slopes. Primary species include Red Spruce, Balsam Fir, Yellow Birch, Red Maple and Eastern hemlock. Lesser components of Northern white cedar, Tamarack, White birch, American beech and several other Northern hardwoods can also be found in this forest type. While the softwood trees in these forests may not reach the lines as quickly as the hardwood, these forests are often heavily stocked with trees growing very tightly together, creating difficult trimming conditions.

Eastern Hemlock is often found in conjunction with Yellow birch, predominately in well-drained areas along benches and flats and among frequent rock outcroppings, on what would be considered mixed wood sites. Pockets of White pine are scattered throughout the VEC rights-of-way, predominantly found on sandy, well-drained soils. In heavy seed years, these species

aggressively invade VEC's rights of way. The trees in these forest types are tall growing, easily reaching heights of over 50-100+ feet, and they frequently represent potential danger to utility lines.

UNDESIRABLE VERSUS DESIRABLE VEGETATION

Following any initial disturbance, there is an orderly development of different types of vegetation over time on land that is left idle. Annual weeds such as ragweed and pigweed are generally the first to appear, followed by grass-like plants and biennial or perennial herbaceous broadleaf weeds. Next, shrub-like plants become established and eventually trees. While the low growing vegetation found during the earlier stages of development are most desirable in utility rights-of-way, regardless of which stage of vegetation development a right-of-way is in, it will eventually develop into a forest, if it is not maintained.

Essentially all of the commercial tree species found in the forest types identified within VEC rights-of-way are classified as incompatible with electric utility lines (See Appendix G – Incompatible Vegetation List). They are generally moderate to fast growing species, reaching mature heights in excess of 15 feet tall. Immature trees (less than 4 inches in diameter at breast height and with the capability to exceed 15 feet in height) are defined as incompatible target brush for the purposes of this plan.

Although immature target brush does not pose an immediate threat to system reliability or safety, allowing it to mature can increase maintenance costs and impede or prevent accessibility to electric facilities. Aggressive incompatible target brush species control is crucial in limiting VEC's future vegetation control workload and cost increases.

While individual healthy trees existing within rights-of-way may be pruned and maintained in order to avoid contact with conductors, the majority will be eliminated when economically feasible, and planting of these tree species within the rights-of-way is strongly discouraged.

The most common reason for pruning an incompatible tree rather than removing it is landowner request. This may be because of the aesthetic value, or because of its value as a shade tree or as a screen from a highway. Apple trees, due to their value as wildlife feed, will be pruned for maximum clearance without jeopardizing their survival and removed only when necessary.

Not all vegetation found in VEC rights-of-way is undesirable. There are many low-growing plants and shrubs such as lilac, serviceberry, dogwood, hawthorns, honeysuckle, etc., which can be compatible with utility lines. In wetlands and boggy areas, species such as speckled alder and pussy willows, as well as cattails, ferns and many other low growing plants and shrubs are quite compatible (See Appendix H – Compatible Vegetation List).

Retaining or encouraging the growth of low-growing desirable vegetation will help to suppress the growth and density of less desirable species. While shrub growth will not eliminate the encroachment of tree species, it will compete with the other species for nutrients, light, and space.

Significant shrub growth shall not be retained in the area immediately surrounding pole locations and the centerline under the conductors. These areas should be kept free of obstruction to facilitate access to the poles and create an open climbing space. This is especially important for any plant species bearing briars or thorns, as they could cause a puncture hole in a lineman's rubber gloves, thereby creating the risk of electric shock.

SOILS

Vermont has a wide variety of soils most of which create desirable conditions for tree growth. The parent materials range from hard crystalline rocks to lake-plain sands and clays. The glaciers caused a mix of solid with sandstone, limestone, clays and shales. Podzolic soils tend to dominate our landscape. Hydromorphic soils are also found in Vermont. In the higher elevations we find rough stony land with shallow podzols.

The soils that are dominant in the northeastern portion of Vermont are loams and clay loams that came from glacial drift. Stony and gravely loams, also from glacial drift, are found prevalent in the Connecticut and Champlain valleys. The latter soils have lower bulk densities and higher permeability rates than clay and silt clay soils.

In addition to site conditions for tree species, soil structure is important in relation to field stabilization or erosion control. Less stable soils may require extra care and maintenance such as the installation of water bars and seeding in places where the soil is disturbed by vegetation maintenance activities.

Although soils in the state are often acid and fairly low in phosphorous, they are generally very suitable for vegetative growth. In general, vegetation requires low nutrient levels for good growth conditions.[3]

VEC's forestry staff review and evaluate specific site conditions as they relate to soil stability, soil productivity and tree growth when determining the appropriate vegetation maintenance activities in any given area.

CLIMATIC CONDITIONS

Throughout the year, Vermont's climate is extremely variable. The wet spring season, combined with productive soils, often results in rapid tree and shrub growth.

Vermont is near the middle of the North Temperate Zone and the prevailing winds are from a westerly direction. Climate in Vermont can be described as changeable and on some occasions violent. Extremes of temperatures of both heat and cold are common. Temperatures can range from 100ºF above to 42ºF below zero.

Ice storms and heavy wet snows are not an uncommon condition in Vermont. When rain falls from a warm upper layer into a shallow freezing cold area near the earth, ice is formed on exposed objects. Ice on the side of a dense, unbroken evergreen, 50 feet high with an average

[3] Dickinson, D. "Central Vermont Public Service Corporation (CVPS) Transmission Right-of-Way Management Plan", 2003.

crown width of 20 feet, weighs about 5 tons, clearly representing a significant danger to utility lines.

Wind, in combination with rain, wet snow and/or ice, can have devastating results. Heavy rains, especially in the spring or late summer, have the effect of softening up the typical Vermont soils, thus increasing the likelihood of trees blowing over in the wind.

Severe cold can also cause problems. This is especially true when the drop in temperatures is sudden. Water in branch seams, expanding when it turns to ice, can break limbs off. Rapid drops in temperature can cause other mechanical damage to bark resulting in rot and eventual breakage.[4]

SPECIAL ELEMENTS OF VEGETATION MANAGEMENT

There are several special elements that must be considered in the development and implementation of a vegetation management plan. These elements include wetlands, wildlife, aesthetics, erosion control, fire protection, public lands, invasive exotic species and rare, threatened or endangered species. What follows is a description of management considerations in each of these areas.

Wetlands

VEC has incorporated the wetlands data layer available through the Vermont Agency of Natural Resources (ANR) into their system map and strives to minimize the impacts of vegetation maintenance activities to wetlands while meeting the goals and objectives of the vegetation management program.

Wetlands in the State of Vermont are regulated by the Vermont Water Resource Board. This board has developed and issued the Vermont Wetlands Rules, by which activities in wetlands are guided. The University of Vermont Extension Service has developed a booklet titled "Wetlands Rules and Regulations: What they mean to your logging operation in Vermont". This publication summarizes the major rules and regulations affecting timber harvesting in Vermont's wetlands and shall serve as a guide for VEC's vegetation management activities within wetlands.

Vegetation management activities within wetlands are typically limited due to the slower growth of most trees in wet areas and the fact that many plant species which tend to grow in wetlands, such as speckled alder and pussy willows, as well as cattails, ferns and many other low growing plants and shrubs are generally compatible with electric utility lines. When limited cutting and/or pruning activities are conducted within wetlands, brush will not be placed in areas of open water.

Wildlife

VEC recognizes that a properly maintain utility right-of-way promotes bio-diversity which results in favorable habitat conditions for many wildlife species.

[4] Dickinson, D. "Central Vermont Public Service Corporation (CVPS) Transmission Right-of-Way Management Plan", 2003.

Early successional habitats, such as those created by most accepted vegetation management techniques, are critical in the maintenance of healthy populations of birds and other wildlife species dependent upon such areas. Retention of compatible low-growing vegetation within VEC rights-of-way provides beneficial habitat for wildlife. A right-of-way covered with a diverse shrub growth has been shown to support a greater and more diverse population of songbirds than a clear-cut right-of-way. Maintaining and encouraging a diverse plant and shrub community along VEC rights-of-way will provide beneficial food sources and cover, as well as nesting and brooding habitat for ground nesting birds. Mechanical vegetation maintenance techniques will be avoided during bird nesting season.

Covering thousands of miles of ground, the VEC rights-of-way host many different and varied wildlife habitat niches. Some of the important habitat components present include: coarse woody debris; undeveloped, relatively remote acreage; varying vegetation age and structure; significant areas of "edge" (the interface between two differing habitat types, for example the area where an open right-of-way and forest meet); wetlands and riparian areas; and mast producing plants and shrubs such as raspberries, apple trees and Mountain ash.

Open-forest "edges" such as the transition zones between the forest and maintained rights-of-way support distinct wildlife communities. Edges are heavily used by wildlife to feed in, as they offer the greatest number of niches in the least amount of area. Mixtures of forested and non-forested habitats produce long-lasting brushy edge habitats for species that would not otherwise be found in either heavily forested or very open habitats. For example, one would expect to see Cooper's hawks, indigo buntings, catbirds, song sparrows and foxes along these brushy edges between forested and non-forested habitat.

Aesthetics

A cleared right-of way can have a raw look, with little apparent vitality. Retaining low-growing compatible species wherever possible helps to maintain an aesthetically pleasing right-of-way, without compromising long-term line clearance.

As a member-owned cooperative, VEC is very conscious of the appearance of the rights-of-way following vegetation management activities. The use of proper pruning techniques is critical to maintain the health and appearance of mature trees remaining along the rights-of-way. Following tree removal, stump heights and disposal of brush, chips and remaining wood are all designed to minimize visual impact. Following tree removal in residential areas, VEC requires disposal of brush and chips to leave a clean appearance. Also, trees are cut so that stumps are close to the ground thus minimizing visual impacts. Screens are retained where practical in visibly sensitive areas.

Erosion Control

VEC's vegetation management program is designed to encourage the stabilization of vegetation such as ferns and grasses, blueberries, blackberries, raspberries, serviceberry, dogwood, hawthorn and other low-growing shrubs that will promote strong healthy root mat conditions.

Erosion along stream banks is of particular concern. If incompatible species dominate the species composition of a stream bank, removing all vegetation during one cycle will be avoided, if

possible. If removing all vegetation cannot be avoided, appropriate erosion control methods will be implemented.

Mechanical vegetation control methods which result in significant soil disturbance will be followed with the installation of waterbars and seeding and mulching where necessary to minimize soil erosion. Where possible, sensitive areas will be left covered with vegetation to help stabilize the soil.

Where applicable, VEC will conduct vegetation management activities in accordance with the Acceptable Management Practices for Maintaining Water Quality on Logging Jobs in Vermont, as published by the Vermont Department of Forests, Parks and Recreation.

Fire Protection

VEC will adhere to all Federal, State and local fire protection laws and regulations.

Public Lands

VEC recognizes the impact vegetation management activities can have on public lands such as State and Federal Wildlife Management Areas, State Forests, Parks and Recreation Areas and municipal forests and parks adjacent to a utility right-of-way and will work with the various agencies to develop vegetation management strategies to meet the goals and objectives of VEC's vegetation management program, as well as those of the site.

Invasive Exotic Species

These are plant species which have been purposefully or accidentally introduced outside of their original geographic range and are able to proliferate and aggressively alter or displace native biological communities. These plants often lack the predators that keep them in check in their own native regions and can out-compete native plants for space, sunlight and nutrients. Native plants help keep an ecosystem healthy and stable and are generally more beneficial to wildlife populations. Infestations of exotic plants can interfere with plant diversity, navigation, recreation, water supplies, production on agricultural and range lands and create public health and safety hazards. Although many invasive exotic species are low-growing, they can seriously impede access in utility rights-of-way and make it difficult to work safely on and around the power lines.

VEC recognizes the threats posed by invasive exotic plant species and will identify and work to arrest the spread of exotics along rights-of-way where practical. In particular, invasive exotic plant species will be addressed where pioneer populations are becoming established and/or where existing populations are heavily established in the wire zone. VEC will also work with landowners to control invasive exotic species along the right-of-way in areas where they are being controlled by a landowner on lands adjacent to the right-of-way. These invasive exotics may include, but are not limited to: glossy and common buckthorn (*Rhamnus spp.)*, oriental bittersweet (*Celastrus orbiculatus*), Japanese knotweed (*Fallopia japonica)*, common reed (*Phragmites australis*) and several species of honey suckle (*Lonicera spp.*).

Rare, Threatened or Endangered Species

VEC has incorporated the significant communities data layer (including rare, threatened and endangered species) available through the Vermont Agency of Natural Resources (ANR) into their system map and are working with ANR and other Vermont utilities to develop best management practices designed to minimize the impacts of vegetation maintenance activities to rare, threatened and endangered species while meeting the goals and objectives of the utilities' vegetation management programs.

DETERMINATION OF VEGETATION MANAGEMENT NEEDS

The Manager of Forestry is responsible for establishing a preventative maintenance strategy, identifying an appropriate routine maintenance cycle, identifying necessary funds to complete maintenance on the desired cycle, determining a scheduling unit, prioritizing scheduling units and completing routine maintenance systematically and on the desired cycle. Vegetation maintenance records, service interruption data, detailed Line Worker Reports, aerial and ground patrols and member input all contribute to assigning priorities for vegetation maintenance each year.

There are several factors the Forestry staff must consider when evaluating vegetation management needs. These include the frequency of service interruptions, vegetation quantities and characteristics, time elapsed since last treatment and member requests. Extreme weather conditions such as thunderstorms, snowstorms and high winds will also need to be taken into consideration and often take priority over treatments scheduled based on normal factors.

Frequency of Service Interruptions

Outage History Reports describing the location and cause of each outage are generated by VEC's Outage Management System (OMS) and reviewed by the Manager of Forestry to identify any vegetation-related outages (See Appendix I – VEC OMS Outage History Report). Each time a crew is dispatched, a Line Worker's Report is completed, including detailed information about the call. Line Worker's Reports for all vegetation-related calls are submitted to the Manager of Forestry for review (See Appendix J - VEC Line Worker's Report). By referring to these records, it is possible to isolate areas of frequent vegetation-related outages incidence and conduct further review to determine whether they should receive immediate attention or if action can be delayed until regularly scheduled maintenance.

Vegetation Quantities and Characteristics

As vegetation growth rates vary significantly with respect to species and location, it is important to routinely monitor the general condition of the vegetation throughout the system. This can be accomplished by random line patrols and/or random sample vegetation surveys.

Among the elements to be considered in such a program are:

1. Present tree-to-conductor clearance
2. Species of vegetation
3. Present size and density of vegetation
4. Demographic and accessibility characteristics (e.g. urban vs. rural, roadside vs. off-road, etc.)
5. Type of work and crew (e.g. pruning, removal, aerial lift crew, manual flat cutting crew, etc.)

6. Any special conditions (e.g. poor access, steep slope, riverbank, etc.)

In addition to these elements, important non-vegetation factors to be considered include customer density and critical members such as hospitals, members on life-support systems, and members using complex computer systems with volatile memories.

Time Elapsed Since Last Treatment

Vegetation maintenance activities are entered into VEC's System Map, allowing the Forestry staff to track and audit map-based vegetation control information and. quickly determine how long it has been since a line was last maintained, note any areas that were skipped over and/or identify line sections which may need attention sooner than the remainder of the line.

Member requests

Frequently, members have specific concerns, which they feel should receive immediate attention. These requests are often directed to the Line Department and are frequently situations that can be handled by the local line crew. If the merit of the request is questionable or if the scale of the work required in order to respond to the request is extensive, the request is referred to VEC's Forestry staff. Following a field review, the determination is made as to whether the issue is one which is endangering the utility line, a priority is assigned to the problem area and it is handled accordingly.

INSPECTION AND MONITORING STANDARDS

Understanding the extent and nature of the vegetation to be managed is essential to developing and implementing VEC's vegetation management program effectively. Accurate information regarding the vegetation conditions on VEC's rights-of-way will permit the development of historical records, which will allow for an assessment of the effectiveness of past management decisions. The following is a description of various methods of right-of-way inspection and monitoring used on VEC's rights-of-way.

Helicopter Patrols

This type of patrol is done to determine general right-of-way conditions on VEC's transmission system including equipment conditions, as well as vegetation conditions. Aerial patrols are generally conducted four times a year to monitor right of way conditions, provide an overview of vegetation growth and general changes in right-of-way conditions, identify potential hazard trees and assist in targeting areas in need of further review.

Dead and dying trees, as well as those that are beginning to wind throw or starting to bend due to water conditions and/or unbalanced crown can often be spotted. Notes are made regarding the type and location of potential problems and aerial patrols are often followed up by more extensive and exacting ground patrols.

Routine Ground Patrols

These patrols are conducted on VEC's transmission and distribution systems. They are administered from a vehicle and on foot on a routine basis to evaluate the right-of-way condition in a given area as follows:

Reconnaissance Patrol

This is done on an annual basis in areas that are being considered for maintenance in the upcoming year. The areas targeted for ground patrol are determined by review of maintenance records and outage reports, as well as casual field observations made by the VEC employees and/or members. During this patrol, information is gathered regarding vegetation species present, evidence of tree-conductor contact and conditions of sensitive areas. Notes are made on potential problems and estimates of time and crew composition to do the job.

Operations Patrol

This is the most frequent patrol and is carried out prior to and during all vegetation management operations. Information concerning access, danger trees, clearance levels of aesthetic screening and road conditions is gathered.

Danger Tree Ground Patrol

Information concerning danger trees is received from helicopter patrols, field observation by line crews, line clearance crews and members. Foot patrols are carried out on an on-going basis to determine the number and a more accurate evaluation of these "danger" trees.

Field Review

This is done to determine the nature of a specific condition or situation. Some examples of this type of activity are: logger working near lines; erosion due to new road on ROW; new plantings observed under lines or any other type of encroachment. Notification of the individuals involved may also be carried out. Frequency of these checks is as needed.

VEGETATION CONTROL SYSTEMS

The manner in which vegetation maintenance is completed on an electric system has direct impacts on reliability, safety and cost-effectiveness. One component of VEC's vegetation management program is an on-going exploration of economically and environmentally sound vegetation management strategies.

It is understood that there are varying risks associated with every course of action and all vegetation management techniques represent a cost, which will eventually be paid by VEC's members. When reviewing options for vegetation control, VEC has an obligation to all its members to provide safe, reliable power in an efficient manner at a reasonable cost. The decision as to which methods of vegetation control will be used must be based on factors that transcend the desires or possible benefits of any one individual.

VEC will select the method to control undesirable vegetation at any given location on the basis of treatment effectiveness, site characteristics, environmental impacts (including impacts to desirable, non-target vegetation species), safety and economics.

Integrated Vegetation Management (IVM) is a control concept that considers a combination of methods to control undesirable vegetation including biological, chemical, cultural and physical (e.g. mechanical and manual). Within each of these technologies there are several methods, depending on the type of vegetation, site characteristics, and environmental or aesthetic concerns.

Flexibility is an important aspect of IVM, affording a right-of-way manager multiple options to employ the most effective methods of control in a given area. Properly implemented, IVM is recognized as a methodology that encompasses a range of industry-established best practices. It is therefore, an integral component of an effective vegetation management program. VEC's IVM program began in 2009 with the introduction of the selective use of herbicides on VEC rights-of-way.

In general, physical and/or chemical control methods are the most appropriate and most frequently used vegetation control options for utility rights-of-way. The retention of low-growing, compatible vegetation will inhibit the future growth of incompatible species and is therefore considered a form of biological control. Other biological controls (e.g. grazing by animals) and cultural controls (e.g. using fire to eliminate undesirable vegetation) have limited application and are seldom used as utility vegetation maintenance techniques.

The vegetation management techniques described in this section are recognized by the electric utility industry as the best management practices available for maintaining trees and controlling incompatible target brush species within the right-of-way on an overhead electric system.

Physical Control Methods

Mechanical control is the oldest vegetation management method and includes hand-pulling, hoeing, blading, mowing, cutting, pruning, carefully controlled burning, flooding, bulldozing and cropping. These control methods provide short-term control, are generally very labor intensive, pose a significant risk of traumatic injury to applicators, and are therefore quite costly to implement over large areas. The most common forms of mechanical control used on utility rights-of-way are described below, as stated in the NRECA CRN's Vegetation Management Manual.

Flat Cutting

This technique involves the use of chainsaws or brush saws to remove undesirable target vegetation at ground level. This is the preferred maintenance technique for sites where obstacles (e.g. rocks, poles, etc.) exist or terrain conditions prevent access by mowing equipment and herbicides cannot be used. Unfortunately, hand cutting only affects the above-ground portion of the vegetation that is being maintained. The root collar area of the cut vegetation remains in-tact and viable, which typically results in vigorous stump sprouting and, in some species, root suckering, as well. Consequently, this technique only provides short-term control and is generally significantly more expensive than alternative methods. Optimally, flat cutting should be followed by subsequent herbicide applications where appropriate to control re-sprouting.

This method is a primary method of control on VEC rights-of-way in areas of dense underbrush and trees, which must be removed due to their proximity to the conductors. Stems are cut as close to the ground as possible and stump heights shall not exceed 3 inches. Cuts shall not be made on an angle, which can be hazardous to humans, animals and equipment. If a line is not located immediately along a public road or highway, the wood and brush is windrowed at the edge of the right-of-way. If the line runs immediately along and adjacent to a road, the wood is piled at the tree line and the brush is chipped.

Pruning

This technique involves the use of hand saws or chainsaws to remove dead or living parts or branches of a tree. This is the preferred maintenance technique where removal of all trees near the conductors is not necessary, economically feasible or aesthetically acceptable or where only the branches of a tree rather than the tree itself pose an immediate threat to the conductors. In these cases, it is acceptable to prune the tree. This method is a primary method of control on VEC rights-of-way in residential areas.

The type of pruning and amount of live tissue that should be removed depends on tree size, species and age, as well as the location of the vegetation in relation to the conductor. All tree species have defined growth habits, which lend themselves to certain types of pruning. Familiarity with these growth habits is essential. Most shade trees lend themselves well to natural pruning or directional pruning, i.e. pruning a tree in such a manner that it guides the growth of the tree away from the conductors.

The use of well-trained professional arborists capable of determining the best pruning techniques in a given situation is essential to the success of VEC's vegetation management program. Descriptions of proper pruning techniques and improper trimming practices can be found in VEC's Specifications for Vegetation Management, as well as in the American National Standards Institute (ANSI) Std. A300, "Tree, Shrub, and Other Woody Plant Maintenance-Standard Practices," The International Society of Arboriculture's "Best Management Practices Utility Pruning of Trees" and Dr. Alex Shigo's booklet titled "Pruning Trees Near Electric Utility Lines."

Danger Tree Take Downs

This technique involves the complete removal of a mature tree which represents a hazard to the electric facilities, due to its size, location and/or condition.

Many trees at the edge of the right-of-way have crowns that have grown in towards the conductors. Many factors influence a tree's physical condition. Some examples are: disease, insect damage, frost, lightning and mechanical damage (i.e. logging, road construction, etc.), age, soil conditions and genetic factors. Some trees appear normal and healthy yet are in a poor condition, having serious rot with only a thin wooden shell on the outside. Signs of a dying tree can be very evident or very subtle, and are often only recognized by an experienced forester or arborist.

When evaluating potential danger trees, it is important to know at what size each species is mature and which species are most susceptible to heart rot. Signs to consider include: seams, fungus, fruiting bodies, bark condition, root condition, wood cellular condition and tree configuration. Another consideration is the effect that removing a tree will have on the remaining trees.

Of primary consideration when cutting danger trees is the safety of the public, the line clearance crew, and the electric facilities. Some tree removal conditions require de-energizing the conductors prior to the operation. The safety risks of tree removal are generally greater than

those of standard right-of-way maintenance. The removal of danger trees is slow, costly, and at times, a difficult procedure.

As a result of deferred maintenance in many locations across VEC's service territory, current right-of-way conditions require aggressive tree removal in order to re-establish adequate clearance.

In addition to utility initiated tree removal, this maintenance technique is frequently utilized on VEC's rights-of-way as a result of a member request. When a property owner requests such a removal, the wood and brush disposal is generally their responsibility. If VEC chooses to take down a danger tree, absent of a member request, brush disposal will be the responsibility of VEC, but the wood is considered to be property of land owner.

Mowing

This technique involves the removal of incompatible target species with a large cutting machine attached to a tracked or rubber-tired vehicle. Depending on the size of the mowing equipment being used and the target species being managed, vegetation up to about 8 inches in diameter can reasonably be cut. As with hand cutting, mowing results in the immediate elimination of all undesirable target stems. However, this technique is less selective and all desirable low-growing vegetation within the mower's path is eliminated as well. This results in the site being left in a disturbed and more open state, which allows tree seeds to germinate, in addition to encouraging stump sprouting. Consequently, mowing will not provide long-term control unless followed up with an herbicide application to control re-sprouting.

Site conditions must be evaluated carefully when considering mowing, as this technique has a potential to compact soil and/or cause erosion. Mowing shall be avoided during ground bird nesting periods.

This is the preferred maintenance technique for drier sites that support moderate to heavy densities of incompatible target species and are relatively flat with few obstacles (e.g. rock outcroppings, boulders and stone walls). It may also be a desirable method for short-term control in locations where herbicides cannot be used. This method of control is used on VEC rights-of-way, where site conditions are suitable.

Planting

This technique involves the planting of grass, shrubs and certain species of trees within the right-of-way. Pruning and mowing is used to conduct maintenance on these locations. To prepare the site for this condition requires grading and filling with topsoil. It is sometimes used near substations and is costly to establish and maintain. Planting shrubs and trees in a right-of-way condition is often difficult. The mass of roots and organic matter is not conducive for survival of planted material. The shallowness of the soil and rocky ground condition are also obstacles. This management technique is also used in instances of erosion control.

Chemical Control Methods

The effectiveness of selective herbicide application has been well documented by the electric utility vegetation management industry. Judicious herbicide use is an important component of an

IVM strategy. It is critical to the establishment of a low-growing plant community within rights-of-way, which results in a cost-effective vegetation management program. Other important benefits of IVM include:

- Increased visibility and access along rights-of-way
- More timely and less costly outage restoration
- Safer working conditions for line workers and line clearance contractors
- Improved species selectivity
- Long-term control
- Promotes stable plant communities
- Supports natural (biological) control
- Promotes bio-diversity among plants and wildlife
- Only feasible control method for invasive species
- Only method that lowers undesirable stem densities, reducing future maintenance costs
- Most efficient and economical control

By impeding the sprouting and growth of undesirable species, which generally increase in density following the implementation of mechanical control methods, the use of herbicides facilitates the establishment of low-growing desirable plant communities. As these communities become well-established, the occurrence of non-compatible tree stems decreases and future maintenance costs are reduced. These plant communities also provide a more stable environment than the cyclical environment which follows the use of mechanical control methods. The most common forms of chemical control used on utility rights-of-way are described below, as stated in the NRECA CRN's Vegetation Management Manual.

Broadcast Foliar

Broadcast foliar applications are applied to the foliage of target tree species during the period of active growth when leaves are fully developed (late spring to early fall). A fixed herbicide rate per area is applied in a water solution and broadcast over the entire target area. Broadcast foliar herbicide applications are sometimes the most cost-effective way of initially controlling heavy-density communities of tall-growing target tree species, particularly over large areas. Following initial control, this type of application is not done on an extensive basis, as it is not desirable to eliminate all of the vegetation in the right-of-way. VEC will not conduct broadcast foliar herbicide applications.

Cut Stubble Applications

When a reclamation phase is necessary and the moderate to high-density vegetation is too tall to initially implement a broadcast herbicide application, the site should first be mowed before herbicides are applied. An herbicide can be applied via a broadcast foliar application one or two growing seasons following mowing to vegetation that has re-sprouted. An alternative is to immediately follow mowing with a broadcast application of a soil-active herbicide, which prevents re-sprouting altogether. This technique, known as a cut stubble application, is employed in more visually sensitive areas since treated vegetation has minimal leaf-out and brown-out is substantially reduced.

This maintenance technique is subject to the same limitations described for mowing and broadcast foliar herbicide applications. The cut stubble technique is not selective, meaning that many desirable species are usually eliminated with this treatment method. Depending on the herbicide formulation used, some selectivity for grasses can be achieved. VEC will not conduct cut stubble herbicide applications.

High-Volume Foliar

High-volume foliar is an application technique that typically utilizes a maneuverable vehicle (such as a truck or tractor) equipped with a large spray tank. The concentration of herbicide used for this technique is low. Herbicide applications are applied to the foliage of target tree species using a hand-held, high-volume spray gun. Maximum effectiveness is generally achieved when target tree heights are between 8 and 15 feet.

High-volume foliar applications should be performed during the period of active growth and when leaves are fully formed (generally from late spring to early fall). This technique can be performed on any site as long as terrain conditions permit access by spray vehicles.

When treating a right-of-way that has a high density of target species, the difference in results between selective high-volume foliar and uniform broadcast applications will often be minimal. The vast majority of plant materials on the right-of-way should be target species if either of these application techniques is used, which will result in a right-of-way with a browned-out appearance.

Low-Volume Foliar

This method of application uses a higher concentration of herbicide than the high-volume technique. The selectivity of the low-volume foliar spray technique is achieved through the close application of coarse sprays that are directed at individual stems or clumps of non-compatible target species while directing the spray away from compatible vegetation. Low-volume applications are generally targeted at incompatible stems that are less than 6 to 8 feet high and of low to moderate density. A conventional diaphragm or piston pump backpack is the most commonly used piece of equipment for low-volume applications, but small-volume battery-operated tanks on ATVs have also been used effectively.

Low-volume foliar applications are directed at the top of the crown of target stems, and the upper 60% to 75% of the crown typically receives treatment. Application is made to wet the leaves, but not to the point of runoff. As with other foliar application techniques, low-volume applications should be done during the period of active growth, when leaves are fully developed.

Low-Volume Basal Bark

Basal applications control undesirable vegetation through the application of an herbicide and penetrating oil mixture to the lower 12 to 15 inches of target stems. The mixture typically contains a relatively high proportion of herbicide to oil (20% to 30% by volume) that effectively controls trees up to 6 inches in diameter at a low spray volume.

Low-volume basal herbicide applications offer increased flexibility over foliar applications. Basal applications can be performed during the dormant season, as well as during the period of

active growth. Dormant season applications allow crews to be productive during the off-season and can be advantageous in some locations where the brownout associated with foliar applications may be objectionable. This is a very selective application technique.

Basal herbicides are typically applied with a backpack application unit equipped with oil tolerant seals. The backpack unit utilizes a low volume wand that can deliver a small amount of herbicide mixture to the lower stem of target species. The entire circumference of the lower stem of target species is sprayed to wet, but not to the point of runoff. Basal applications can be made at any time of the year except when snow or water prevents spraying stems to the ground line, although they are most effective when applied in the late dormant season (from late winter to early spring) rather than in the late fall or early winter periods. VEC will not conduct herbicide applications in the rain or snow or on frozen ground.

Cut Surface

Cut surface or cut stump applications involve hand cutting incompatible target vegetation followed immediately (at least within 1/2 hour) by a waterborne herbicide application to the exposed cambium layer along the perimeter of the stump surface. The treatment window can be extended by up to 6 months if the herbicide solution includes a penetrating oil. If the latter method is employed, any exposed bark and root flares should be treated to the point of runoff to the root collar zone, in addition to treating the cambium layer. Indicator dyes can be included in the solution to help identify stumps that have already been treated.

Immediate cut surface applications are typically applied with a hand-held trigger spray bottle. Because of the small amount of herbicide solution that is applied very close to the cambium area along the edge of the stump surface, there is minimal opportunity for non-target or off-site contamination. Delayed applications may require a backpack applicator as a result of the greater volumes of herbicide solution that must be applied to each stump.

This is the preferred application technique in areas containing low to moderate densities of incompatible target stems where hand cutting is the preferred maintenance technique and herbicides can be used. Cut stump applications can be made year-round as long as snow does not prevent the cutting of stems at ground level. However, tardiness in the application or outright misses can drastically influence the effectiveness of the treatment.

Treatments done in the early spring when tree sap flow is high can also have reduced effectiveness. Long-term cost savings can be realized by using the cut stump treatment method on tree removals to prevent re-sprouting.

CONTRACT STRATEGY

Vegetation Management represents a significant expense to VEC and its members. Careful monitoring of all aspects of contract negotiation and administration are critical to ensuring the implementation of VEC's vegetation management plan as cost-effectively as possible. The following factors will be considered:

- Competition helps to maximize the value of vegetation management expenditures.
- Low bids that are not responsive to contract specifications are likely to create complications and adversely impact cost-effectiveness.

- Annual or multi-year contracts encourage stable employment opportunities, which allow contractors to hire and retain qualified personnel.
- Long term contracts shall be carefully evaluated, as periodic contract negotiation promotes competitive pricing.
- Low-quality work or poor production from individual crews will undermine the program's effectiveness and shall not be tolerated.
- Contract method (e.g. time and materials, firm price or unit price) and crew complement (e.g. aerial crew vs. ground crew, etc.) must be carefully evaluated in relation to the specific site conditions (e.g. roadside vs. off-road, high vs. low density vegetation) and type of work to be done (e.g. pruning vs. flat cutting, etc.).

CONTRACTOR ACCOUNTABILITY

The Contractor is required to train all field personnel (supervisors and technicians) in the concepts of VEC's Vegetation Management Plan and Program and the crew foremen shall keep a copy of VEC's Vegetation Management Specifications (See Appendix D) in their possession while working on VEC rights-of-way. VEC's Forestry staff will inspect the field crews on a frequent basis (generally, at least once a week) to monitor activities and insure compliance with VEC's Vegetation Management Specifications and all related regulations and safety standards (See Appendix E - VEC Vegetation Management Field Inspection Report). Quality of performance shall be evaluated based on:

- Compliance with all safety regulations
- Clear understanding of performance expectations
- Quality of work (proper pruning techniques, stump heights, adequate clearances, proper disposal of brush, chips and wood, site clean-up, etc.)
- Productivity
- Public Relations
- Communication with VEC Forestry Staff
- Record Keeping (completeness and accuracy)
- Equipment Maintenance

In addition to frequent visits to active job sites, VEC's Forestry Staff periodically reviews completed jobs to evaluate effectiveness and quality and to determine whether or not plans were understood and followed.

Formal VEC Safety Observations are conducted monthly, with a goal of conducting a minimum of one observation on each crew operating within VEC rights-of-way at least annually. (See Appendix D Exhibit 6) - VEC Qualified Line Clearance Contractor Safety Observation Report.)

MAPPING

VEC has a Geographic Information System (GIS) based map. Each utility pole throughout VEC's service territory has been located in the field with a Global Positioning System (GPS) Unit. Detailed electric facility information such as individual substations, pole and circuit numbers and protective devices are all identified in the map. In addition, vegetation management activities are scheduled and tracked utilizing a full featured, map-based data collection and editing software application.

VEGETATION MANAGEMENT RECORDS

To effectively administer a vegetation management program, considerable data is required to support decision-making and the planning process. A comprehensive record-keeping and reporting system is an essential component of a successful vegetation management program.

VEC's Utility Vegetation Maintenance Reports (Appendix D Exhibit 2) include type of utility line being maintained, location of work performed, total distance covered and total distance treated , crew identification, labor and equipment hours and type of maintenance that was conducted. These reports are received weekly along with the associated invoices, and data is entered into an access database, with which, line maintenance data is analyzed and reports are generated.

In addition to the maintenance reports and access database, vegetation maintenance activities are tracked in VEC's GIS based map, providing a quick reference for identifying areas which have not been treated recently and/or areas that may have been skipped.

VEGETATION MANAGEMENT PLAN REVIEW

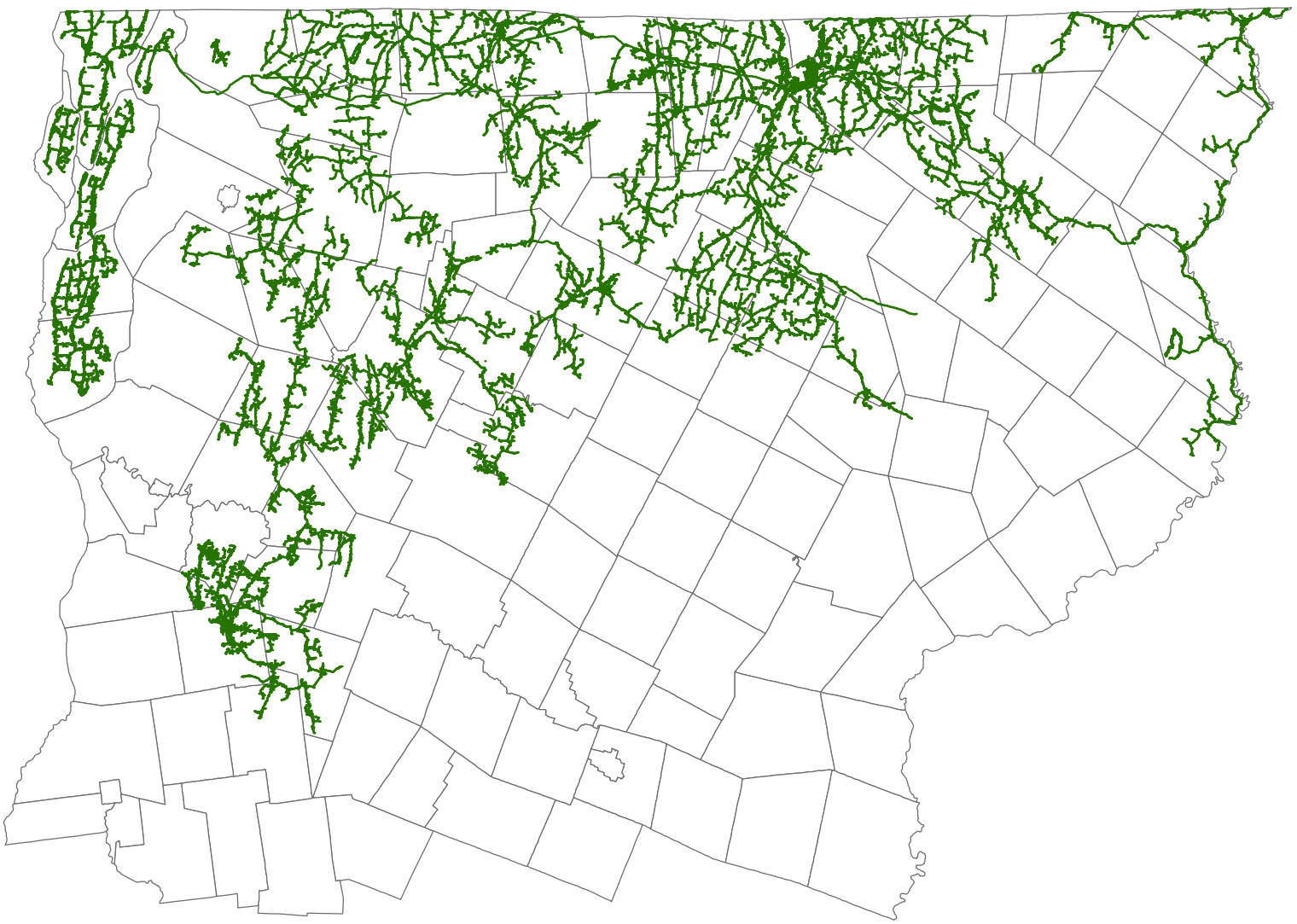
The Manager of Forestry and Chief Operating Officer will conduct an internal annual review of VEC's vegetation management program to ensure that the goals and objectives identified on page 4 of this management plan are being met. Vegetation management activities and associated outcomes will be evaluated to measure accomplishments and seek areas to improve upon. Specific areas of consideration include:

- Cost per foot / Year End Reports
- Vegetation-Related Safety Hazards and Service Interruptions
- Tree-Related Service Orders
- Physical Condition of Rights-of-way
- Right-of-way Easements
- Vegetation Control Methods
- Contract Strategy
- Member Customer Contact/Notification
- Public Relations
- Environmental Impact
- Visual impact
- Best Management Practices (i.e. Integrated Vegetation Management, Water Quality, Exotic Invasives, Rare, Threatened and Endangered Species)

VEC's vegetation management program shall include the flexibility to adjust for conditions as they are found in the field, as well as for future changes in land use. VEC rights-of-way are treated on a prescription basis. Each area is evaluated based on site-specific conditions and management methods and schedules are assigned appropriately.

Results of the annual review and other periodic evaluations will be compiled and plan revisions will be made at least once every 5 years.

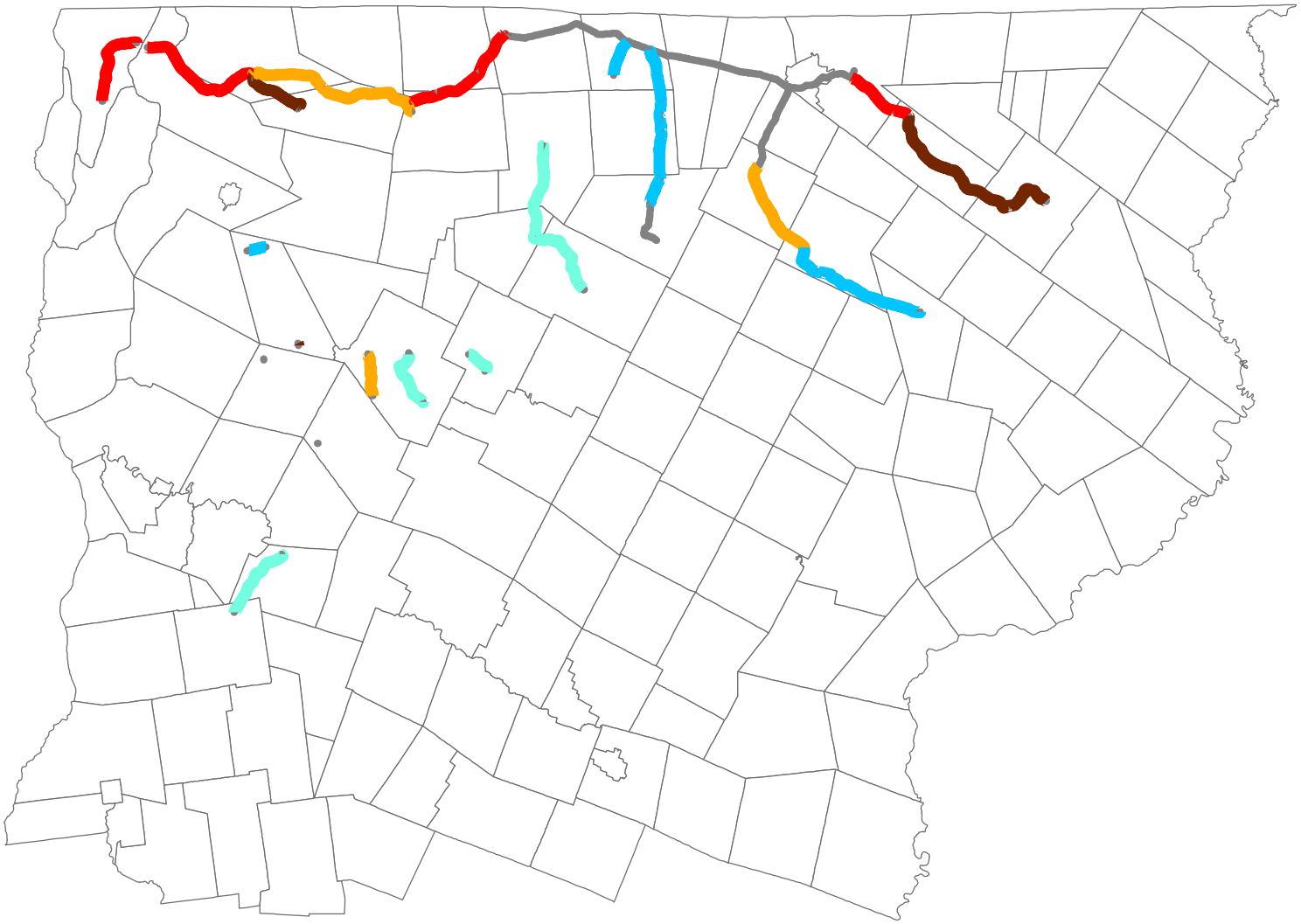
Appendix A



VEC TRANSMISSION & DISTRIBUTION LINES

Vermont Electric Cooperative, Inc.
Service Territory
3/10/14
Vermont Electric Cooperative, Inc.
42 Wescom Rd
Johnson VT

Appendix B



5 YEAR CYCLE

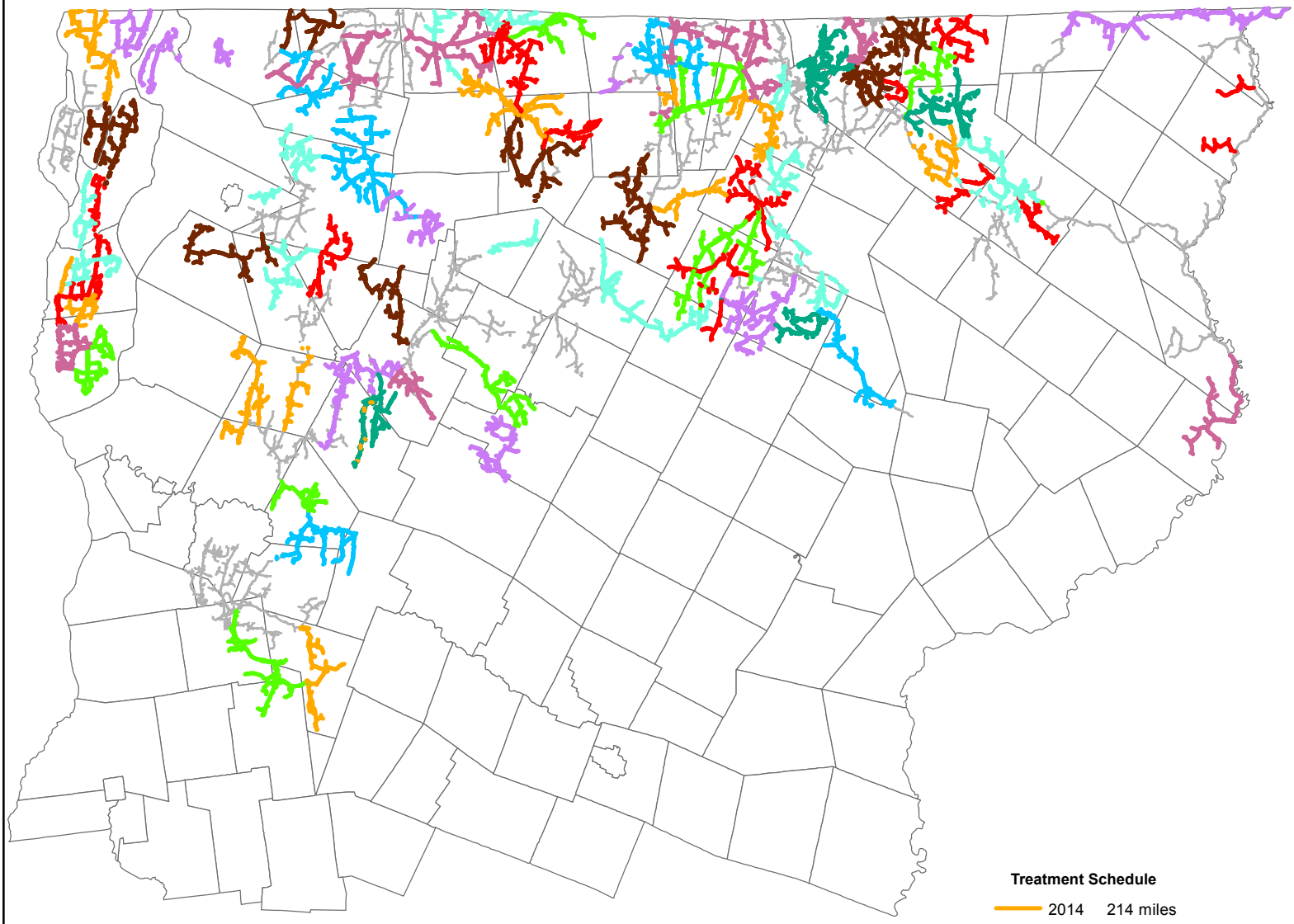
2014	25 miles	279 acres
2015	31 miles	376 acres
2016	27 miles	133 acres
2017	21 miles	156 acres
2018	27 miles	248 acres
Total	**131 miles**	**1192 acres**

Maintained by VELCO or GMP

Vermont Electric Cooperative, Inc.
Transmission System
Vegetation Management Treatment Schedule
3/14/14

1 in = 13 miles

Appendix C



Treatment Schedule

2014	214 miles
2015	204 miles
2016	210 miles
2017	215 miles
2018	204 miles
2019	183 miles
2020	205 miles
2021	195 miles
2022	129 miles
Total	**1,759 miles**

Primary Overhead

Vermont Electric Cooperative, Inc.
Distribution System
Vegetation Management Treatment Schedule
3/14/14

1 in = 12 miles

Specifications for Vegetation Management On Transmission and Distribution Systems

PREPARED BY:

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Licensed in New Hampshire #350
Society of American Foresters, Certified #1175

TABLE OF CONTENTS

GENERAL INFORMATION

Scope

The purpose of these specifications is to set forth in clear terms the methods, procedures, and other information necessary to guide those engaged in vegetation management work on the Vermont Electric Cooperative transmission and distribution system. The work shall be completed in conformance with these specifications and all other provisions of the contract documents.

Safety

This specification is not intended to replace or interfere with the implementation of any national or state safety standards or OSHA regulations. VEC is not indicating that these are the only such laws, rules, codes, or regulations that Contractors and their employees need to comply with. Each Contractor is individually responsible to ensure that it is in compliance with all laws, rules, codes, and regulations (including all applicable safety rules of VEC) that apply to the nature of its daily business (see Safety Standards).

Definitions

Adjuvant

A relatively nontoxic ingredient added to the herbicide mixture to assist the active ingredient in doing its job (e.g. wetting agent, spreader, adhesive, emulsifying agent, penetrant, anti-drift agent, etc.).

Blazed

Marked (usually with an axe or hatchet and/or paint) to identify a trail or boundary line.

Branch Collar

A "shoulder" or bulge formed at the base of a branch by the annual production of overlapping layers of branch and stem tissues.

Cambium

A thin formative layer between the bark and the sapwood of most vascular plants that gives rise to new cells and is responsible for secondary growth.

Clearance

The distance between conductor and vegetation crown edge.

Conductors

The wires strung from insulator and pole to insulator and pole that carry electrical current. Usually located in the central part of the right-of-way.

Conifer

A cone-bearing tree or other plant that produces seeds in a structure called a cone. Trees such as spruce, fir and pine are conifers.

Contractor
Any person, persons, partnership, company or corporation with which VEC has a contractual relationship for vegetation management services.

Crown
The upper portion of foliage on a tree or shrub.

Crown Reduction Pruning
A method of pruning used to reduce the height of the tree. The main leader or leaders are cut back to suitable laterals (at least one-third the diameter of the limb being removed).

Danger Trees
Any tree that due to size, location and/or condition, has a potential for damaging the conductors or structures now or within the next few years. Dead, dying, and diseased trees; multi-stemmed trees with weak crotches and/or included bark; and excessively leaning trees that could damage overhead electrical facilities if they failed structurally all fall into this category.

Deciduous
A tree or other plant that sheds its leaves annually and stays leafless generally during the cold season; the opposite of evergreen. Trees such as maple, ash and cherry are deciduous.

Desirable Species
Those plant species that at maturity will not attain a height that will endanger the safe and reliable operation of the line, and will provide food and/or cover for wildlife.

Diameter at Breast Height (DBH)
Diameter of a tree measured at a point 4 1/2 feet above the ground.

Distribution
A line voltage system used for carrying primary voltages ranging from 2.4kv to 14.4kv from substations and metering points through VEC territory with purpose of serving members.

Emulsifying Agent
A chemical which helps one liquid form tiny droplets and thus remain mixed in another liquid. Used to form a stable mixture between two liquids which usually would not mix (e.g. oil in water).

Energized
With voltage flowing to or through.

Fording
Crossing of a body of water, without the use of a bridge.

General Foreperson / Supervisor
Supervisory personnel working for the Contractor who is responsible for work performed by any and all of that Contractor's crews.

Included bark
Bark enclosed between two branches or a branch and the trunk with narrow angles of attachment, forming a wedge between the branches and often resulting in a dead spot.

Insulator
A device made of electrical insulating material used to separate or support conductors.

Lateral
Secondary or subordinate branch.

Line Map
The general location of the right-of-way as indicated on maps supplied by VEC.

Lop
To cut or sever woody branches.

Overhang Pruning
Removal of limbs overhanging the conductors, depending on the type of facility, tree species and/or other site conditions. Overhanging limbs should always be removed from above high-voltage transmission lines.

Pollarding
The practice of maintaining certain species of trees and shrubs at a predetermined size by systematically removing annual growth, resulting in a flush of slender shoots and branches each spring.

Pruning
The use of widely recognized, proper arboricultural techniques to remove limbs or branches from a tree.

Re-closing
The automatic reconnection of electrical flow following an unplanned interruption of that flow. A reclosure device will automatically re-close a circuit following an electrical fault.

Right-of-way
The right, established by common or statutory law, to utilize a strip of land over which the utility's electric power lines pass.

Roundovers
Rounding over (or shearing) is the practice of making many small cuts so that a tree crown is sheared in a uniform line. This creates an unhealthy tree condition and results in rapid regrowth.

Rutting
Tracks worn by a wheeled vehicle, tracked equipment or habitual passage, resulting in a channel, groove or furrow in which water could flow.

Screen
Trees serving as an ornamental device shielding an area from view.

Selective Cutting
Removal from within the right-of-way or easement boundaries of only that vegetation that would potentially interfere with the construction and/or operation of the utility line.

Shrub
A woody plant that normally matures at a height of less than 20 feet with a generally bushy appearance and several erect, spreading, or prostrate stems. It usually attains a diameter of less than 4 inches at breast height (41/2 feet above ground).

Side Pruning
Cutting back or removing the side branches of a tree. Limbs should be removed at a lateral branch or the main trunk.

Slash
Debris made up of cut saplings, shrubs, branches, limbs, stems and treetops less than 4 inches in diameter, as well as leaves, twigs and bark resulting from a clearing/pruning operation.

Specification
The detailed description of the method and manner of performing work.

Stubbing
Indiscriminate cuts made between lateral branches, rather than at the lateral. This practice damages the tree and encourages rapid re-growth.

Substation
A subsidiary station in which electric current is transformed.

Surfactant
An herbicide mix additive that improves the wetting, spreading and penetration characteristics of herbicides.

Topped
Condition in which the top of a tree has been reduced/removed by stubbing off major limbs.

Transmission
A line voltage system used for carrying high voltages (in the range of 34.5kv to 46kv) from power suppliers to VEC substations with the purpose of serving VEC distribution systems.

Tree
A woody plant normally maturing at 20 feet or more in height and achieving a diameter at breast height of at least 4 inches.

Under Pruning
Removing limbs from the lower portion of the tree crown to allow conductors to pass below the tree. All cuts should be made as close as possible to the branch collar at the base of the branch.

VEC
Vermont Electric Cooperative, Inc.

VEC Forestry Staff
Any individuals employed by VEC and designated by VEC Management to implement the Vegetation Management Program. The VEC Forestry staff will be an SAF Certified Forester and/or ISA Certified Arborist.

VEC System Operator
Any individual employed by VEC and designated by VEC Management to interact with members on service problems, dispatch line personnel to restore power and correct service problems, monitor and record power system flows, control generation and transmission system switching and issue work clearances.

Waterbar
A man-made device designed to turn running water and/or drain wet sections of a road or trail.

Windrow
A long, low heap or pile of cut vegetation.

Water Supply Areas
Areas controlled or owned by a public or private agency used for water supply purposes.

Field Considerations

Acessibility

VEC's roadside utility lines are accessed by state, local and private roads. The Contractor shall be responsible for, at his/her own expense, returning all road surfaces to as good or better condition as they were initially. All temporary traffic control installation, maintenance and removal shall be in compliance with the Manual on Uniform Traffic Control Devices (MUTCD) as published by the U.S. Department of Transportation Federal Highway Administration and adopted by the Vermont Agency of Transportation.

Off-road sections shall be accessed by a single route wherever possible. If any variations from the original access are needed, the Contractor must have the approval of the property owner or his representative and the VEC Forestry staff. The Contractor shall restore, to its original condition, or the landowner's satisfaction at Contractor's expense, all property so damaged during the operation.

Stream Crossings

Existing bridge crossings should be utilized to the maximum extent possible for equipment crossings, holding fording to a minimum in areas where it is necessary to cross streams and/or rivers, the Contractor will be responsible for obtaining all necessary permits or written approvals.

Where applicable, vegetation management activities shall be conducted in accordance with the Acceptable Management Practices for Maintaining Water Quality on Logging Jobs in Vermont, as published by the Vermont Department of Forests, Parks and Recreation.

Pipelines/Railroads

If it becomes necessary to cross any pipeline or railroad with equipment, it shall be the responsibility of the Contractor to obtain the necessary permission for such a crossing from the appropriate companies. The Contractor shall hold VEC harmless from all claims resulting from such crossings.

Water Quality and Supply Areas

The Contractor shall not cause the discharge of any materials into the waters of Vermont including but not limited to organic material and petroleum products.

All man-made and natural water supply areas will be left undisturbed. Springs, pipelines and natural watercourses fall into this category.

Where applicable, vegetation management activities shall be conducted in accordance with the Acceptable Management Practices for Maintaining Water Quality on Logging Jobs in Vermont, as published by the Vermont Department of Forests, Parks and Recreation.

Fences, Stonewalls, Blazed Property Lines
Fences or stonewalls that are damaged within the right-of-way or along access roads, will be restored to the condition they were in before the job began. All gates and fences will be kept closed unless otherwise directed. The Contractor will be responsible to see that any livestock in or near the work area are kept safe and not allowed to escape their pasture area as a result of vegetation management activities.

Blazed property lines will be maintained where practical. The Contractor will contact the VEC Forestry staff when blazed trees are found in or on the edge of the right-of-way. If a blazed property line tree is a danger tree, then is should be topped and/or trimmed.

Screens
Over the years, many screens have been established to lessen the visibility of VEC's transmission and distribution system. These should have the following characteristics:

- Adequate clearance for maintenance of vegetation present.
- Suitable low growing vegetation.
- Shallow depth for ease of maintenance of vegetation (less than 25ft).
- Not act as a major barrier to right-of-way access and line maintenance.
- Adds to the overall aesthetics (e.g. a hedgerow at the edge of a field often may be suitable because of low growing shrubs and it tends to maintain an existing natural area).
- The vegetation shall not be allowed to grow any closer than 12 feet from the lines.

If the above criteria cannot be met, then the screen shall be cut or not established. The VEC Forestry staff shall make this determination. It is far better to plant the proper shrubs than to try to maintain a problem area.

Vegetation to Avoid When Cutting
Vegetation that will not have a negative impact on the conductors or accessibility shall be retained. The Contractor's Foreperson shall be trained to differentiate between low growing desirable shrubs, trees, and high brush. If there are questions, the VEC Forestry staff shall be contacted. Many plants, such as alder, arbor vitae, sumac (in some cases), bayberry, hawthorns and others are suitable for wildlife habitat and will tend to discourage encroachment of trees. Some conifers may be left in areas where there is suitable species and/or clearance. This shall be determined by the VEC Forestry staff.

- **Christmas Trees**
  Christmas tree plantations may be allowed to grow as determined by VEC Forestry staff. If any area appears to have been used for harvesting Christmas trees, it shall be skipped and the VEC Forestry staff shall be notified.

- **Ornamental Plantings**
  All plantings of this type should be referred to the VEC Forestry staff for review. If plant species are of acceptable mature height and are environmentally compatible with the right-of-way, poles, lines and equipment; then no further action should be required.

  If they are not, then the property owner should be notified. When the latter situation results in vegetation that is less than 15 feet away from the conductors, the VEC Forestry staff will have the tree pruned back to 20 feet or more.

- **Natural Trees Near Residences or Commercial Buildings**
  Unless previously maintained, trees which are growing naturally (as opposed to being planted) within the minimum clearance distance, near residences or commercial buildings should be cut after notification of the property owner.

- **Cherry Trees in Pastureland – CAUTION!**
  Cherry tree leaves that are wilting are poisonous to animals. It is important that these trees be removed from pastures or left uncut until the farmer is notified and animals can be removed. When this situation occurs, it shall be reported on the weekly maintenance report, including specific location.

- **Maintenance Agreement Locations**
  Specified sections on some rights-of-way are subject to previous Agreements to be maintained by property owners. These areas shall be skipped unless otherwise directed by the VEC Forestry staff.

Erosion Control

Vehicle and equipment tracks leading to rutting of access roads and damage to fragile parts of the right-of-way shall be avoided. Most potential problems can be handled with shovels and picks. Where necessary, waterbars shall be installed by hand to drain wet sections of access roads and minimize erosion problems. Extra caution is needed where soils are sandy and/or where the terrain is steep. The brush shall be cut and left on the ground or hand piled on one side of the access roads.

Erosion along stream banks is of particular concern. If incompatible species dominate the species composition of a stream bank, removing all vegetation during one cycle shall be avoided, if possible. If removing all vegetation cannot be avoided, appropriate erosion control methods shall be implemented.

Mechanical vegetation control methods which result in significant soil disturbance will be followed with the installation of waterbars and seeding and mulching where necessary to minimize soil erosion. Where possible, sensitive areas will be left covered with vegetation to help stabilize the soil.

Where applicable, vegetation management activities shall be conducted in accordance with the Acceptable Management Practices for Maintaining Water Quality on Logging Jobs in Vermont, as published by the Vermont Department of Forests, Parks and Recreation.

Fire Protection
All Federal, State and local fire protection laws and regulations shall be adhered to and the Contractor shall be responsible for obtaining any necessary permits.

Operation Standards

Supervision
VEC's Forestry staff will direct the Contractor's General Foreperson or Supervisor of the work areas and be in charge of vegetation management operations, communicating to the crew(s) through the General Foreperson/Supervisor.

VEC will provide assistance to the Contractor for locations of access and parking areas. All rights-of-way will be previewed with VEC's Forestry staff before operations begin. The Forestry staff will provide the General Foreperson with a line map and all known records pertinent to the individual right-of-way.

The Contractor is responsible for providing adequate supervision of all employees at the work site. The Contractor must effectively supervise employees to ensure the satisfactory completion of all applicable vegetation management operations safely and efficiently. This includes routine inspections of crew production and quality of work, any necessary discipline or remedial training, provision and maintenance of tools and equipment, provision of necessary maps, etc.

Crew Coordination
The General Foreperson or Supervisor will coordinate activities and assist the Crew Forepersons on a regular basis.

Crew Forepersons
A crew Foreperson shall:

- be capable of supervising all work performed by his/her crew to the satisfaction of the VEC Forestry staff.
- be responsible for the crew's production and proper work techniques, as well as for ensuring that the crew operates in a safe and prudent manner.
- maintain accurate records and notes concerning the crews' work.
- be familiar with the contents of these specifications and carry them out.

Crew Size
The standard cutting crew consists of three men (one foreperson, one climber and one laborer). The minimum for light maintenance will be one man plus a working foreperson. Two person crews shall not be used in remote areas. In certain situations, it may be necessary to have a crew of four or more as per the VEC Forestry staff.

Herbicide application crew make-up is determined based on the access, brush density and width of the right-of-way along the specific line sections to be treated. The minimum for light maintenance will be a two person crew. All herbicide application crews shall have a minimum of one crew member on-site and within voice command, who is a certified herbicide applicator in the state of Vermont.

Larger crews consisting of several applicators and a support technician to move materials and equipment will need to have at least two certified herbicide applicators, as the individual handling/moving the material must be certified and there must be a certified applicator within voice command of the physical application taking place.

Public Relations
Supervisors must have sufficient public relations skills to be able to effectively communicate with the public as the need arises. Supervisors and workers shall be presentable and act professionally. If necessary, contact with members, landowners, and public officials shall be courteous and businesslike. Any discussion of impending maintenance shall be clear and precise in order to avoid misunderstanding or apprehension. If a misunderstanding occurs and cannot be resolved, the Contractor shall notify the VEC Forestry staff. Trucks and other equipment shall be kept clean and neat and in good working order.

Work Schedule
The General Foreperson shall submit a weekly work schedule to the VEC Forestry staff, identifying daily crew locations. Time shall begin and end on-site, travel time is at the Contractor's expense. If time is lost due to a holiday, inclement weather or other reasons, it may be made up on Saturday, or working additional hours per day (only with the approval of the VEC Forestry staff). Invoices will not be paid if advanced approval is not secured.

Work Progression
The Contractor shall work progressively along the line and shall complete all assigned work before starting work in another location. Exceptions shall be approved in advance by the VEC Forestry staff.

Equipment and Tools
Each line clearance truck will be equipped with a complement of tools that allows the Contractor to complete the assigned work efficiently, professionally, and productively. All-Terrain Vehicles (ATV's) may be used in areas with poor access with landowner permission and approval by the VEC Forestry staff. All trucks, chippers, and saws are to be maintained so that the safety, quality and quantity of work completed is not impaired (See Exhibit 1 – VEC Operating Procedure OP 27 Part One: Oil Spill Reporting Procedure). VEC reserves the right to request that equipment experiencing excessive mechanical problems be replaced. Routine maintenance of equipment by the Contractor will not be completed during normal working hours unless authorized by the VEC Forestry staff.

All equipment will be invoiced according to actual use. VEC will not be invoiced for spare or idle equipment present on the job site.

Maintenance Reports
VEC shall furnish Utility Line Vegetation Maintenance Report Forms (See Exhibit 2). The Contractor shall turn in these reports weekly, which are to be completed on a daily basis and made available to the VEC's Forestry Staff. The original copy of the work report shall be submitted along with the invoice. The work report includes identification of the crew Foreperson, all labor and equipment hours and specific daily work location information, including the distance of line covered and distance of line cut at each location. Payment may be withheld as a result of incomplete Maintenance Reports.

Billing
Invoices will be submitted weekly and accompanied by Maintenance Reports. Substation name and number will be listed on the sheet. If two different Substations have been worked on during one week, separate maintenance reports will be submitted for each. All invoices must be approved by the VEC Forestry staff.

Line Defects
Any line defects observed, such as excessive conductor sag, broken insulators, broken guy wires, split crossarms, etc., shall be reported directly to VEC's Scheduling Department (802-730-1135) in a timely manner.

Work Inspection
The Contractor's work shall at all times be subject to inspection by the VEC Forestry staff and public authorities. Contractor shall notify the VEC Forestry

staff of any proposed changes in daily crew assignments or working hours sufficiently in advance.

Improper Work Techniques
Any variance from instructions given the crew by the VEC Forestry staff or from VEC policy as stated herein, will be grounds for dismissal of Foreperson and/or all or any member of the crew from VEC rights-of-way.

Property Owner Notifications
The Contractor has the primary responsibility for contacting property owners prior to the commencement of vegetation management work. Personal contact will be made wherever possible and a VEC member notification hang tag will be left at all residences along the rights of way scheduled for maintenance activities (See Exhibit 3 – VEC Member Notification Hang Tags).

Where personal notification has not been made, maintenance activities will not take place for a minimum of 5 days following the placement of a VEC member notification hang tag. If 5 days have passed and the hang tag has not been removed from the door, the Contractor shall notify VEC Forestry staff of the location and obtain any available contact information to facilitate notification prior to maintenance activities.

A reasonable effort will be made to identify property owners at locations where there is not a nearby residence.

Herbicide applications shall only take place following personal contact and clear identification of property boundaries.

In instances where the Contractor is unable to identify and/or contact a property owner, the Contractor will work with VEC's Forestry staff to determine the appropriate course of action prior to any herbicide application.

System Operation Procedures

Contact Availability
All Crew Forepersons shall carry a pager and a cell phone and the Contractor shall provide VEC with a contact sheet including cell, pager and home phone numbers for all Crew Forepersons, as well as Company Management. The Contractor and their employees shall respond to all calls from VEC immediately.

Notification of Work Locations
Crew Forepersons shall notify the VEC System Operator (802-730-1219 or 800-832-2667) prior to commencing work on a daily basis. Notification shall include specific work location(s) identified by substation, device, line number, structure number, and road location. Notification of work location shall take place when conducting member notifications, as well as when conducting maintenance

activities. The Crew Foreperson shall also notify the VEC System Operator if they change locations during the day and when they go off the VEC system each day.

Calling on and clearing off the system must be done on location and shall not be done from home or the garage. Calls for work locations where there is not cell service must take place as close as possible to on-site arrival and departure.

Crew locations are entered in the Control Center Daily Log, identifying the location of all line clearance crews (including herbicide application crews) as they call in. The crew will not be logged off the system until the Crew Foreperson has cleared off the system through System Operations.

In the event of an outage on a circuit identified as having a line clearance crew or herbicide application crew on location, the VEC System Operator will not re-energize the conductors until he/she has made contact with the Crew Foreperson on that line, and an "all clear" is received.

If the line clearance/herbicide application crew(s) does not clear off the line(s) by 6:30 p.m. or they can't be reached, unless otherwise notified, the VEC System Operator will contact the Contractor's General Foreperson or a member of the VEC Forestry staff. These individuals have the authority to report the line clearance/herbicide application crew(s) as cleared off the line.

Outages

When working on or near energized facilities, the Contractor shall take all necessary precautions to prevent any unscheduled outages and/or damage to facilities.

Crew Forepersons shall carefully and continually monitor the safety of their crew while involved in vegetation maintenance activities near energized electric facilities. When specific vegetation conditions result in situations where the required maintenance is unsafe, the Contractor shall take the appropriate measures and request blocking of automatic re-closing or a scheduled outage.

The Crew Foreperson is responsible for requesting blocking of automatic re-closing through VEC System Operations. Requests shall be placed when conducting vegetation maintenance activities in compliance with all applicable safety rules and regulations where the Crew Foreperson determines taking additional precautions is prudent (e.g. vegetation is located beside or above high voltage transmission lines, vegetation is placing tension on the electric facility, condition/construction of the electric facility contributes to the potential for an electrical fault occurring, etc.).

A Utility Initiated Outage Request Form (See Exhibit 4) shall be submitted to VEC Forestry staff for all outages being requested by line clearance crews. All

trees which are within minimum approach distances and cannot be reached with an insulated tool shall be left untouched and reported to VEC's Forestry staff along with a Utility Initiated Outage Request Form.

In the event that the Contractor experiences any contact (direct or indirect) with the electric facilities and/or is responsible for an unscheduled outage, all work shall immediately cease and desist, the crew will clear off the line and the Crew Foreperson will notify the VEC System Operator immediately (Emergency phone: 802-635-9294). After clearing off the line, the Crew Foreperson shall stay on site to speak with VEC Line Personnel when they arrive to restore power. An interview and post incident review shall be conducted with the entire line clearance crew by VEC's Manager of Safety and Compliance and/or VEC's Forestry staff as soon as practical, following the incident. A formal incident report shall be submitted by the Contractor. The members of the line clearance crew shall not return to work on VEC's system prior to the completion of incident review and shall only return to the system upon approval by the Manager of Forestry.

Following all incidents where a line clearance crew experiences any contact (direct or indirect) with the electric facilities, all crew members present during the incident will be suspended from working on the VEC System for a period of no less than 3 business days.

Following any incident involving a fault on the line or any compromised state of the electric facility, at least one member of the crew shall remain on site to secure the scene and prevent any members of the public from entering the work zone until VEC personnel have arrived on site. Failure to comply with this requirement shall warrant immediate termination.

Thunderstorms
All line clearance crew(s) must clear off the line in the event of a thunderstorm. Once the thunderstorm passes, crew(s) can go back to work after obtaining proper clearances from the VEC System Operator.

Safety Standards
The Contractor and all contract employees shall comply with the American National Standards Institute (ANSI) standards Z133-1 and A300, the Occupational Safety and Health Administration (OSHA) Regulation 1910.269 (see 29 Code of Federal Regulations Part 1910) and all applicable electric cooperative safety rules. Any Contractor-produced or adopted safety rules should be presented to VEC for review and approval.

Safety Procedures shall include, but not be limited to the following:

- General safety supervision
- Instruction of new employees

- Written pre-job safety briefings (See Exhibit 5 – VEC Line Clearance Contractor Job Briefing Form)

  Briefings shall include identification of the closest emergency 911 address to the work location and cover at a minimum: energy source controls, job hazards review, work procedures, special precautions and personal protective equipment.

  The Contractor shall collect and review all pre-job safety briefings and provide copies to VEC Forestry staff weekly.
- Use of correct protective equipment and gear
- Proper equipment operation
- Location and use of safety equipment and signs on the job
- Other miscellaneous safety considerations (hidden guy wires, brush covered holes, barbed wire, hidden ledges, boulders)
- Observation of a dangerous situation

  It is the Contractor's responsibility to conduct all vegetation management activities in a safe manner. When the condition of vegetation and/or electrical equipment represents an unsafe situation (e.g. vegetation in hard contact with electrical facilities, broken insulators or other hazardous or unusual situations) the Foreperson will postpone maintenance and contact the VEC Forestry staff as soon as possible.

  If there is any question as to the safety of conducting vegetation maintenance activities, they shall be postponed and a temporary outage will be scheduled.
- VEC notification of any injury or safety incident, however slight, which occurs while on VEC's system.
- Routine safety observations of all crews operating on VEC's system.

  The Contractor shall ensure that each crew working on the VEC System is observed by their employer once a month.

  Safety observations shall be conducted by a company Safety Manager or other designated management personnel and must include active work site observation and examination of work methods.

  The Contractor shall furnish documentation and results of all safety observations to VEC Forestry staff by the end of each month (See Exhibit 6 – VEC Line Clearance Contractor Safety Observation Report).

Failure to comply with all applicable safety standards may result in monetary fines levied against the Contractor based on the gravity of the safety infraction and at a rate not to exceed $500.00 per infraction. Fines shall be levied in the form of a direct donation to a charitable organization of the Contractor's choice, with VEC's approval.

Operational Policy

Certificate of Insurance

Contractors will not be allowed to commence operations until VEC receives a certificate of insurance from a carrier approved by VEC, indicating compliance with insurance bonding, which VEC may specify. Insurance coverage must be satisfactory in all respects and have a clause for thirty (30) or more days prior notice to VEC of any change in coverage, including its cancellation. VEC shall be listed as a Certificate Holder and an Additional Insured. Certificates will be submitted to VEC prior to acceptance of a contract, or before commencing work.

Contractor Responsibility

If the Contractor refuses, neglects, or is unable, for any reason, to supply and maintain a sufficient number of properly skilled workmen and/or proper equipment to maintain the scheduled program for this work, or fail in the performance of any covenants contained in these specifications, VEC shall exercise its right to terminate the services of the crew and/or equipment.

Property Owner Refusals

If a property owner refuses to allow the required tree work, line clearance employees shall not agree to reduced clearance or any other deviations from the specifications without the consent of the VEC Forestry staff. All refusals shall be documented and passed on to the VEC Forestry staff for follow-up.

Complaints

All complaints resulting from line clearance operations are the responsibility of the Contractor and if justified, shall be corrected as soon as possible. The VEC Forestry staff is to be promptly notified of all complaints and their resolution. If the resolution involves commitment of extra work, approval shall be received from the VEC Forestry staff before proceeding.

Private Work

Under no circumstances shall the Contractor's employees solicit or accept payment for services rendered or products resulting from those services (firewood, wood chips, logs, etc.) while working for VEC. Should the Contractor enter into an Agreement to provide services to a VEC member when not working for VEC, the Contractor shall notify VEC of this Agreement prior to the commencement of any work.

Legislation

The Contractor shall be responsible for adhering to all applicable Federal, State and local laws, rules and regulations, including but not limited to the Vermont Fire Warden and Slash Law as follows:

It is hereby enacted by the General Assembly of the State of Vermont:

Sec. 2. 10 V.S.A 2648 (a)

(a) A person may cut, or cause to be cut, forest growth only if all slash adjoining the right-of-way of any public highway, or the boundary lines of wood lots owned by adjoining owners, is treated as follows:

(1) All slash shall be removed for a distance of 50 feet from the right-of-way of any public highway or from the boundary lines of wood lots owned by adjoining property owners.

(2) All slash shall be removed for a distance of 100 feet from standing buildings on adjoining property.

LINE CLEARANCE, TREE PRUNING AND REMOVAL OPERATIONS

Scope

This section covers the policies, methods, procedures, and other information necessary to guide those engaged in utility line clearance, tree pruning and removal work. All line clearance work shall be completed in conformance with these specifications.

Tree Pruning Guidelines

Trees that have the potential to interfere with primary lines should be pruned or removed to obtain clearances from tree branch parts. All pruning shall be performed with consideration given to the impact of that pruning on line reliability, individual tree condition and tree aesthetics. All pruning shall adhere to the American National Standards Institute (ANSI) Std. A300, "Tree, Shrub, and Other Woody Plant Maintenance-Standard Practices," and other established and widely accepted pruning guidelines such as those presented in The Society of Arboriculture's "Best Management Practices Utility Pruning of Trees" and/or Dr. Alex Shigo's booklet titled "Pruning Trees Near Electric Utility Lines." All work will be performed with respect to property owners and their lands.

Cutting Methods – The following is a description of the various cutting methods involved in the maintenance of VEC's rights-of-way.

Prime Flat Clearing

This refers to the initial cutting of a right-of-way to establish a corridor for a utility line. All trees within 25 feet of the center pole line on distribution lines shall be removed in preparation for the installation of bare conductors. All trees within 15 feet of the center pole line on distribution lines shall be removed in preparation for the installation of insulated conductors. All trees within 50 feet of the center pole line shall be removed in preparation for the installation of transmission lines.

Maintenance Cutting
This refers to the cutting of incompatible species of vegetation in an established right-of-way to allow accessibility and protection for existing utility lines. Includes flat cutting of all brush within the right of way to ground level, as well as proper pruning of all branches growing over or towards conductors and removal of trees, which cannot be properly pruned to provide adequate clearance.

Widening and Side Pruning
Widening refers to the cutting of an established right-of-way back to legal and/or proper width. Side pruning refers to the cutting of large limbs that are growing over or toward conductors.

Selective Cutting
This refers to cutting in special areas (screens, urban, ornamentals, parks, or other established maintenance work). Selective cutting often requires climbing or bucket work and usually chipping and/or brush removal.

Minimum Tree-to-Conductor Clearances
When pruning trees for clearance around primary overhead distribution conductors (4KV, 12KV & 14.4KV), a minimum of 10 feet of clearance on each side of the outside conductor and 20 feet of clearance for all branches that overhang the conductors shall be achieved. Additional clearance should be achieved on branches that could bend (due to snow or ice loading) or break and contact the conductors below.

*Note: Clearances may need to be reduced in rights-of-way where the total easement width is 20 feet, depending on member permission.

When pruning trees for clearance around transmission lines (34.5KV & 46KV), a minimum of 15 feet of clearance on each side of the outside conductor shall be achieved. No branches shall be left overhanging the conductors.

These clearances should be considered minimum unless the tree is properly side pruned back to the main trunk or a major limb. The tree's location, health, species, and growth rate should be considered when deciding appropriate/acceptable clearances.

Pruning Practices - The following is a description of the pruning practices to be implemented in the maintenance of VEC's rights-of-way.

Directional Pruning
All pruning shall be performed to direct tree growth away from the conductors.

Drop Crotch Pruning
Limbs and branches shall be cut back to a suitable lateral limb or branch that is at least one-third of the diameter of the one being cut. If a proper sized limb or branch is not available, the pruning cut shall be back to the parent branch or the tree trunk.

Proper Pruning Methods
Proper pruning methods include the following:

- Crown Reduction
- Side Pruning
- Overhang Pruning
- Under Pruning

Improper Trimming Methods
Roundovers, topping, stubbing of branches or limbs, or pollarding shall not be done. Exception shall be made only as a result of member refusal to authorize proper pruning techniques.

Quantity Removed
Only healthy trees shall be pruned. No more than one-third of the crown of a tree shall be removed in any one growing season. Removal of more than one-third of the crown can adversely affect the health and/or appearance of the tree. If removal of more than one-third of the crown is required to provide proper clearance, serious consideration should be given to removal of the tree.

Proper Pruning Cuts
Proper pruning cuts are very important in preventing future decay in the tree. Refer to ANSI Std. A300, "Tree, Shrub, and Other Woody Plant Maintenance Standard Practices," The International Society of Arboriculture's "Best Management Practices Utility Pruning of Trees" and/or Dr. Alex Shigo's booklet titled "Pruning Trees Near Electric Utility Lines" for guidance on making proper pruning cuts.

Tree Paint
Research has shown that the past practice of painting cuts with asphalt tree paint does not prevent decay and, in fact, may hasten it. Therefore, tree paint shall not be used.

Bark Stripping
Limbs shall be removed with proper sequence and placement of saw cuts to prevent stripping or tearing of bark from the remaining limb, branch, or trunk. See ANSI Std. A300, "Tree, Shrub, and Other Woody Plant Maintenance-Standard Practices," The International Society of Arboriculture's "Best Management Practices Utility Pruning of Trees and/or Dr. Alex Shigo's booklet titled "Pruning Trees Near Electric Utility Lines" for guidance.

Hangers
All branches, limbs, and tops that hang up in the tree being worked on, or in adjacent trees, shall be removed before moving from that work site.

Climbable Trees
Climbable trees are defined as trees having sufficient handholds and footholds to permit an average adult or child to easily climb the tree without the use of a ladder or special equipment. Climbable trees within VEC rights-of-way in areas where people live or normally congregate shall be considered for removal or modification by the removal of the lower limbs.

Tree Houses
All tree houses, platforms, or other tree structures that are in close proximity to overhead wires and are encountered during line clearance operations shall be reported to VEC's Forestry staff for follow-up. The adjacent property owner shall be notified that the structure must be removed to eliminate a potentially hazardous situation.

Special Clearance
All deadwood and tree parts weakened due to decay, included bark, or split crotches shall be removed if they pose a potential hazard to primary lines or structures.

All vines that are climbing poles or guy wires shall be cut at ground level. The vines should only be removed from the poles or guy wires by use of properly insulated tools if the vines are in contact with energized conductors or equipment.

Tree Removal
Consistent with safety, satisfactory line clearance, economic operation, public relations, and the appearance of public roads, it is desirable to remove trees under certain conditions rather than to trim them. Whenever justified, tree removal should be considered. Low-growing, desirable plant species shall not be removed unless they present a hazard to the system or line workers, or if they hinder access to the line facilities.

Removal Conditions
Trees shall be removed when the pruning necessary to provide proper clearance

- would likely result in the death of the tree.
- would put the line clearance crew or the public in greater danger than removal.

The Contractor shall remove or make safe all identified danger trees. In addition, the Contractor shall primarily remove small trees (less than 12 inches dbh) of undesirable species within 10' of the outside conductor and all whips or saplings within the right of way.

Felling
Trees shall be felled away from the conductors whenever possible. If this is not possible, they shall be topped before being felled to prevent the possibility of the tree striking the conductors.

Cut Stumps
Cut stumps shall not be more than 3 inches above ground and parallel with the grade (no angled cuts). This standard may vary with approval of the VEC Forestry staff as per field conditions. Stumps left higher than 3 inches due to snow depth shall be cut down to the 3 inch standard at the Contractor's expense as soon as practical following snow melt, but no later than May 15th.

Special Deals
Special deals shall not be negotiated with property owners. When a landowner requests or requires the Contractor to do special removal and/or pruning work that is outside the scope of the assigned work, the Contractor shall notify the VEC Forestry staff prior to performing any work.

Disposal Procedures
As specified by the VEC Forestry staff, all trees, brush, and other woody residue shall be disposed of in accordance with the procedures outlined below.

Chipping
Chipping will be the primary method of handling slash from pruning and tree removal operations and shall be done along roadsides, as well as within manicured lawns, established trails and other areas utilized by the public.

Wherever possible, chips shall be blown along the right-of-way, where they will help to slow and/or impede regenerating vegetation. Chips should not exceed 12 inches in depth, and they should not enter surface water, clog culvert pipes, or accumulate in the branches of nearby trees.

In the event that a member objects to chips being blown within the right-of-way, chips may be blown into the woods or removed. If chips are removed from the site, they must be properly disposed of.

Brush Piles
In rural, off-road areas brush shall be moved away from poles, out from under the conductors and neatly windrowed along the right-of-way edge. Windrows shall not be more than 4 feet high and the specific location will not interfere with roads, trails, streams, and property lines.

There will be a 20' firebreak in the windrows every 500 feet.

Lop and Scatter
Upon approval by VEC Forestry Staff, in rural areas where slash density is light and/or upon member request, the slash may be lopped into smaller pieces and scattered within the right-of-way, well outside of the wire zone (i.e. at least 15 ft. from the outside conductors).

Remaining Wood
Trees, which have been cut remain the property of the landowner and shall be left on site. Trees that appear to contain merchantable products shall be left in long lengths (except when it is necessary to take them down in smaller sections). All remaining wood shall be left in manageable lengths, as directed by the member and piled at the edge of the right-of-way (leave wood log length whenever agreeable with the member).

Job Site Cleanup
Upon the completion of work, the Contractor shall leave the work site clean and tidy. All pruning debris and wood shall be disposed of according to the relevant specifications. Contractor shall not dispose of paper, cans, or other trash at the site, and shall pick up and properly dispose of any such items found during the workday. Trash is not to be mixed with pruning debris.

HERBICIDE APPLICATION

Scope
This section covers the policies, methods, procedures, and other information necessary to guide those engaged in target brush species control through the application of herbicides. All line clearance target brush species control work shall be completed in conformance with these specifications, in addition to all other relevant specifications contained in this document.

Herbicide Permit
VEC will obtain a permit from the Vermont Agency of Agriculture to conduct all scheduled herbicide treatments along the utility rights-of-way, which will be reviewed with and made available to the Contractor prior to herbicide application operations.

Herbicide Registration and Approval
Herbicides used for vegetation management must be registered for use by the United States Environmental Protection Agency and approved for use by the Vermont Agency of Agriculture. The Contractor is responsible for ensuring compliance with all federal, state and local regulations governing herbicide use. Herbicides shall not be used in violation of any applicable law or regulation.

Specifications and Application Methods
VEC's Forestry staff will specify the location of all herbicide use and review and approve the type of herbicide, mixtures and method of application.

In all situations, herbicides shall be applied in strict conformance to label requirements and the requirements of any state or federal agency having jurisdiction, except in situations where utility experience and/or generally accepted practices within the industry indicate the need for more restrictive application.

Herbicides shall be applied only by trained applicators and each crew shall have a minimum of one crew member for small crews (2-3 persons) and two crew members for larger crews (4+ persons), who is a certified herbicide applicator in the state of Vermont.

Herbicides shall be applied to target species as directed by VEC Forestry staff along the entire length and width (from outside edge/tree-line to outside edge/tree-line) of the identified right-of-way, excepting any required buffers on water supplies and/or sensitive areas.

Herbicides shall be applied only by manual methods that target individual plants or compact clusters of plants. Aerial or wide-area spraying shall not be utilized.

Herbicides shall be applied at the minimum label rate known to be effective for the target species, brush density and site.

Herbicides shall not be applied in the rain or snow or on frozen ground.

Equipment Condition
All vehicles, spray units, equipment and containers must be spill and leak proof. Equipment with openings and/or connections must be sealed so that leakage will not occur. All equipment shall be properly maintained and shall carry spill control kits.

Security
All vehicles used to carry herbicides shall have storage facilities so that containers/drums can be secured and locked. All chemical containers will have lockable caps and will be locked and left in a secure location whenever unattended.

Additive Requirements
When performing foliar herbicide applications, an adjuvant will be added when recommended by individual product labels and/or requested by VEC.

Mixing Solution
The herbicide solution must be thoroughly mixed by means of circulation or agitation prior to and during application to ensure uniform dispersion of the herbicide concentrate. The proper mixing sequence shall be followed at all times.

Herbicide Samples
VEC reserves the right to sample herbicide and/or herbicide solutions at its discretion.

Licensing Requirements
The Contractor shall assume full responsibility for equipment and personnel licenses as required by federal and state laws and regulations for the work covered by this specification.

Off-Target Dispersion
Herbicides shall not be used at locations where, or during times when they may pose an unreasonable risk of off-target dispersion (e.g. adjacent to streams or gardens or more than moderate wind, in the rain or snow or on frozen ground). Applicators must assess surroundings and evaluate weather conditions to determine if application should be performed. This includes consideration of wind speed and precipitation condition.

The Contractor is expected to perform herbicide applications in accordance with all applicable regulations and label directions in a manner such that off right-of-way damage will not occur. If any off right-of-way damage does occur, the Contractor assumes all liability for the correction of any damage.

Property Owner Notification
VEC will conduct general notification to landowners according to Vermont Public Service Board Rule 3.6 and the Vermont Regulations for the Control of Pesticides. VEC Forestry staff will provide the Contractor with the physical address of all individuals who have previously requested that herbicides not be utilized on their property.

The Contractor is responsible for making personal contact with each individual who has requested that herbicides not be used and meeting with them to clearly identify their water supply and property lines on the ground prior to any herbicide applications.

The Contractor has the primary responsibility for making personal contact with all property owners prior to the commencement of any herbicide applications to discuss the proposed project, identify property lines and locate any un-mapped and/or non-visible water supplies. All member contacts shall be documented in an Herbicide Application Property Owner Notification Log (See Exhibit 7) and contact records shall include crew member name and position, landowner name and contact info, date/time of contact, location of affected property, summary of conversation and actions taken (e.g. identified property lines, flagged water supply/sensitive areas, etc.).

In instances where the Contractor is unable to identify and/or contact a property owner, the Contractor will work with VEC's Forestry staff to determine the appropriate course of action prior to any herbicide application.

In addition to adhering to the general Public Relations specifications discussed on page nine of this document, the Contractor must exhibit a high level of expertise in all relevant subjects related to the use of herbicides for right-of-way maintenance. The Contractor must be able to knowledgeably discuss all aspects of the herbicide application operation, including, but not limited to the effectiveness, benefits and risks of all herbicides being

utilized, regulatory requirements, training of field personnel, application techniques and the transport and storage of herbicides.

Property Owner Refusals
Herbicides shall not be used within the property of any landowner who has upon receiving all available information regarding the planned application, requested that herbicides not be used on their property. All refusals shall be documented and passed on to the VEC Forestry staff for follow-up.

Herbicide Application Field Preparation
The Contractor, working under or with VEC's Forestry staff, shall review all sections of line scheduled for herbicide application to ensure that all environmentally sensitive areas are flagged in the field and noted on the map.

Retention of Compatible Species
The Contractor must understand not only the products they are applying, but also understand natural plant succession and the importance of retention of low-growing, desirable plant species. The Contractor shall ensure that all field personnel are adequately trained in the identification and avoidance of compatible species.

Training
The Contractor shall conduct and document training for all members of herbicide application crews prior to beginning a vegetation control program on VEC's system. Training shall include, but not be limited to:

- Herbicide application techniques
- Proper handling of herbicides
- Interpretation of label instructions
- Spill response
- Identification and retention of compatible species
- Public relations and property owner notification/contact
- Record Keeping
- First aid/CPR; equipment, electrical and fire safety; specific precautions associated with herbicide application and general safety procedures
- The complete contents of the permit issued by the Vermont Agency of Agriculture for the scheduled herbicide application
- VEC's Specifications for Vegetation Management on Transmission and Distribution Systems

Pre-Operation Meeting
The Contractor shall ensure that all members of the herbicide application crew are present for a pre-operation meeting conducted by VEC's Forestry staff prior to herbicide application operations. Topics covered will include a review of:

- VEC line map of area scheduled for herbicide application
- Type of herbicide, mixture, rate of application and method of application

- Permit issued by Agency of Agriculture
- Sensitive areas, water supplies, wetlands, buffer strips, areas to be avoided, etc.
- Significant habitat maps
- VEC's Specification for Vegetation Management on Transmission and Distribution Systems
- Daily notification of work location
- Record Keeping

On-Site Requirements
The following is required to be on-site and available to herbicide application crews prior to and during herbicide application operations:

- Vermont Agency of Agriculture issued permit (including all herbicide labels and Material Safety Data Sheets).
- A minimum of one crew member within voice command of the physical application, who is a certified herbicide applicator in the state of Vermont.
- A VEC line map showing details including: line voltage, power lines, structures, structure numbers, county lines, town boundaries, access, water supplies, wetlands, property owner refusals/requests, etc.
- Required personal protective equipment in accordance with herbicide labels and all other applicable regulations.
- Drinking water and wash water
- Spill Kit including spill response instructions, shovel, absorbent material and container
- Herbicide Spill Response Instructions (See Exhibit 8– VEC Operating Procedure OP 27 Part Two: Herbicide Accidental Release Measures)

Record Keeping
The Contractor is responsible for recording all required information regarding herbicide applications and shall submit weekly reports to the Vermont Agency of Agriculture.

The Contractor shall submit VEC Utility Line Vegetation Maintenance Reports weekly, which are to be completed on a daily basis and made available to the VEC's Forestry Staff. The original copy of the work report shall be submitted along with all invoices.

Herbicide Application Methods
The following provides a brief description of available herbicide application techniques acceptable for use on VEC's system.

- **Selective Low-Volume Foliar Application**
  Undesirable woody vegetation in rural areas below a height specified by VEC's Forestry staff shall be treated with a solution of herbicide, a surfactant (if required) and water. Application is made with either a powered or hand-powered backpack sprayer. The leaf surface is lightly wetted. The applicator is to walk the right-of-way and treat each target plant individually. The spray nozzle is to be turned off when walking between target plants. Care shall be taken not to apply

the herbicide to desirable or non-target species. This herbicide treatment shall be performed only during the active growing season.

- **Selective Low-Volume Basal Application**
  Light to moderate-density undesirable woody vegetation with a height less than the maximum specified by VEC's Forestry staff shall be treated with a solution of herbicide and mineral oil. The lower 12 to 18 inches of the target plant's stem is wetted (not to the point of run off). Application is made with a hand-powered backpack sprayer by an individual walking the right-of-way. Basal treatments can be applied throughout the year, unless snow depths prevent application to the base of the stem and root collar. **VEC will not conduct herbicide applications in the rain or snow or on frozen ground.**

- **Cut Surface Application**
  Stumps of deciduous hardwood trees that have been cut are to be treated with either an herbicide and water (or oil) solution or a "ready-to-use" (RTU) herbicide. The cambium area of the freshly cut stump is treated by an individual with a hand-powered backpack sprayer or a plastic spray bottle.

  Generally, the herbicide is most effective if applied within ½ hour of the tree's being cut with water based herbicide solutions. Mineral or basal oil stump treatment formulations can be treated any time after cutting. Treatment can be performed at any time of the year except when the stump is snow covered. **VEC will not conduct herbicide applications in the rain or snow or on frozen ground.** This technique should be used to control re-sprouting of removed deciduous trees that exceed maximum height restrictions for other herbicide application techniques or are located in sensitive areas. When cutting most conifers or evergreens, no herbicide application is necessary since most of these species do not readily re-sprout with the exception of pitch pine.

NOTE: The specifications in this document were adapted from those found in the National Rural Electric Cooperative Association (NRECA), Cooperative Research Network (CRN) "Vegetation Management Manual", 2000, Central Vermont Public Service Corporation's (CVPS) "Transmission Right-of-Way Management Plan", 2003 and Vermont Electric Power Company, Inc.'s (VELCO) "Four Year Vegetation Management Plan", 1999.

PART ONE: OIL SPILL REPORTING PROCEDURE

I. SCOPE

VEC Operating Procedure No. 27 – Part One: Oil Spill Reporting Procedure, establishes a protocol for reporting by Vermont Electric Cooperative, Inc. (herein referred to as VEC) of discharges and/or releases [of transformer oil] as required under the Federal Water Pollution Control Act pursuant to the requirements of **40 CFR Part 110**/Discharge of Oil.

This procedure is to be followed in the event of a discharge and/or release of hazardous material which necessitates appropriate immediate action to protect human health and environment including but not limited to, emergency containment measures, clean up and reporting as required by Federal, State and Local officials.

II. DEFINITIONS

Agency: The Vermont Agency of Natural Resources

Certified Hazardous Waste Facility: A treatment, storage, or disposal facility which is authorized to operate under a federally approved state hazardous waste program, the federal hazardous waste program, or a foreign government

Container: Any portable device, in which a material is stored, transported, treated, disposed of or otherwise handled

Discharge: The accidental or intentional spilling, leaking, pumping, pouring, emitting, emptying, or dumping of hazardous waste into or on any land or water

Disposal: The discharge, deposit, injection, dumping, spilling, leaking, or placing of any solid waste of hazardous waste into or on any land or water so that such solid waste or hazardous waste or any constituent thereof may enter the environment or be emitted into the air or discharged into any ground or surface waters

EPA: The United States Environmental Protection Agency

Hazardous Material: All petroleum and toxic, corrosive or other chemicals and related sludge

PCB'S: Polychlorinated biphenyls

PPM: Parts per Million

III. BACKGROUND

VEC is committed to complying with the U.S. Environmental Agency CFR Title 40: Protection of Environment and the State of Vermont Agency of Natural Resources, Hazardous Waste Management Regulations

In the event of a discharge and/or release [of transformer oil], VEC will perform the appropriate emergency action, reporting and corrective actions necessary to comply with the State of Vermont, Agency of Natural Resources.

IV. RESPONSIBILITIES

VEC Field/Line personnel responsibility

A hazardous discharge/release (i.e. oil spill) needs to be reported to the State of Vermont, Agency of Natural Resources *immediately* if one of the two following criteria exists:

1. The discharge/release is over 1 gallon and contains greater than or equal to 50 PPM PCB's

2. The discharge/release is over 2 gallons, and contains less than 50 PPM PCB's

The first VEC personnel to discover the hazardous discharge/release will:

- Access the amount of the spill
- Secure the area if necessary
- Perform a Chlor-N-Oil test
- Use proper PPE
- Stop the source of discharge/release if possible
- Contain discharge/release by trenching area with soil and

absorbent material

Clean up procedure

Determine if clean-up is manageable or non-manageable.

Manageable:

- Less than 20 gallons
- Not near water supply or wetland
- Has not penetrated soil 3 inches
- Confined to an area less than 100 feet

Non-manageable

- Threatens or enters waterway
- More than 20 gallons spilled
- Has penetrated soil more than 3 inches
- Spread of an area greater than 100 feet

If the clean-up is manageable, use speedi-dry or other absorbent material where released material is puddled or concentrated.
Place all clean-up material in 55-gallon drums and transport back to the district office. Notify Steve Johnson, 802-730-1211, who will supply drum label and drum number.

If clean-up is non-manageable, advise Systems Operations.

VEC field/line personnel will be responsible for calling System Operations and providing the following information regarding the spill and spill location:

- Source of spill or leak
- Exact location of spill or leak (street address/town)
- Type of material involved
- Result of Chlor-N-Oil test
- Estimated amount of spill or leakage
- Is spill or leak near waterway?
- Containment status
- Is clean-up manageable or non-manageable?

VEC System Operator Responsibility

The System Operator is responsible for obtaining the above information from field/line personnel and relaying this information to Management personnel. The management notification list is as follows:

First Contact:
John Varney, Safety and Compliance Manager
Contact first by pager (802)741-2078, Alpha page
If no response, contact by cell phone (802)730 -4117
If no response, contact by home phone (802)527-2988

If no response:

Second Contact:
Mike Allard, System Operations Manager
Pager (802) 741-2743
Cell Phone (802) 730-4235
Home (802) 334-2324

If no response:

Third Contact:
Justin Lapointe, Operations Supervisor
Pager (802) 742-0666
Cell Phone (802) 793-4554
Home (802) 793-4554

VEC Management Responsibilities

.

Management will contact the State of Vermont, Agency of Natural Resources, Department of Environmental Conservation, and Waste Management Division

(802) 241-3888
After hours: 800-641-5005

Provide ANR with the following information:

- Date/time oil spill discovered
- Street address/town
- Equipment causing leak
- Product spilled
- PCB level (result of Chlor-N-Oil test
- Method of clean-up (if non-manageable, who has been contacted and status of clean-up)

If the clean-up is unmanageable and will require outside assistance, contact: Environmental Products and Services of Vermont Inc., 802-862-1212

Contractors working on VEC system responsibilities

Contractors working for and on VEC's transmission and distribution systems and or properties are obligated to adhere to reporting procedures regarding the discharges and/or releases of oil as required under the Federal Water Pollution Control Act pursuant to the requirements of **40 CFR Part 110**/Discharge of Oil.

Reportable oil spills will be made to the State of Vermont, Agency of Natural Resources, Department of Environmental Conservation, and Waste Management Division

(802) 241-3888
After hours: 800-641-5005

Contractors will also notify the following VEC personnel regarding any oil spill occurring on VEC properties:

VEC System Forester, Sara Packer:
Office 802-730-1104
Pager 802-741-1972
Cell 802-254-1458

VEC Chief Operating Officer, Jeffrey Wright:
Office 802-730-1170
Pager 802-741-1370
Cell 802-730-4233

APPENDIX
FLOW CHART FOR OIL SPILL REPORTING
VEC PERSONNEL

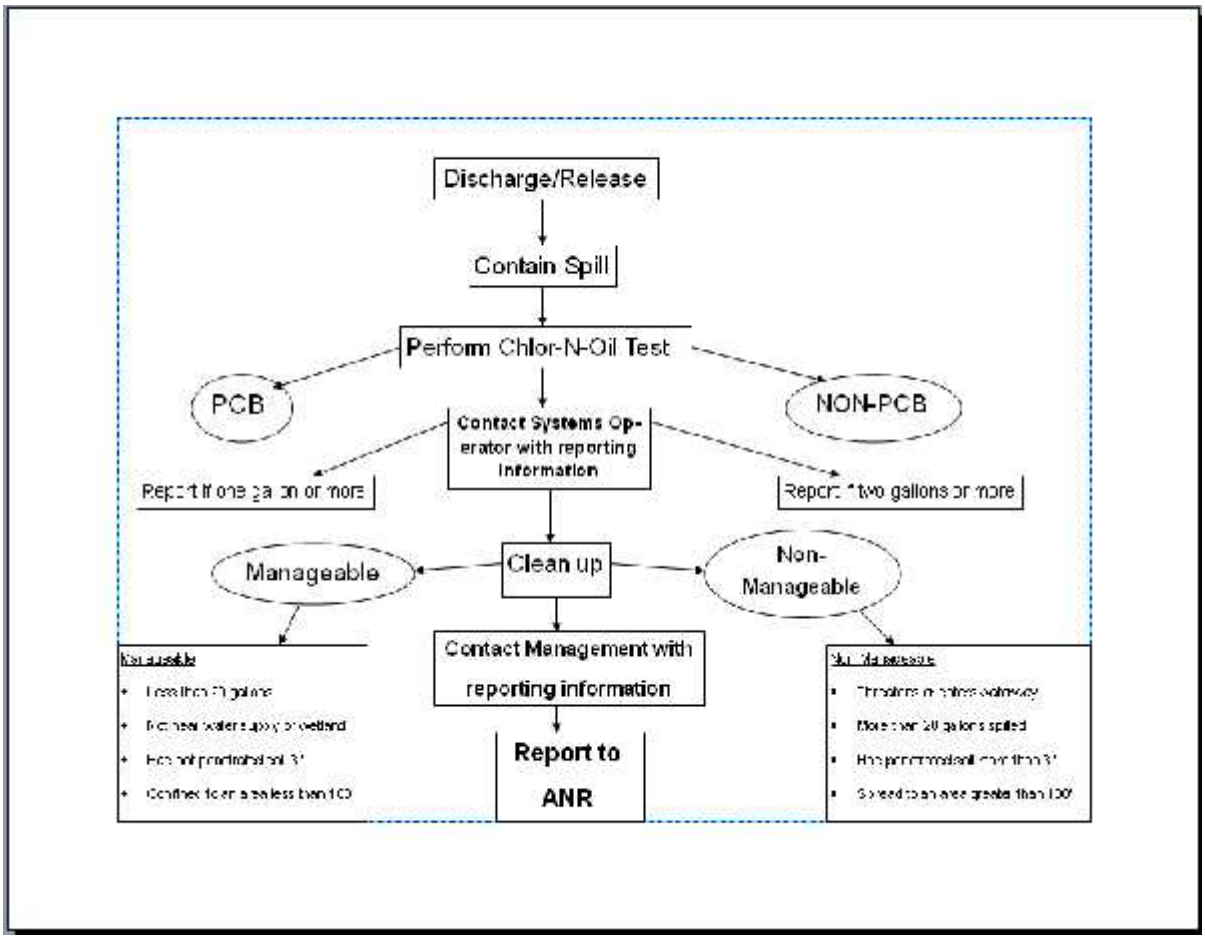


Exhibit 2

VERMONT ELECTRIC COOPERATIVE, INC.
UTILITY LINE VEGETATION MAINTENANCE REPORT

Check One: TRANSMISSION ☐ DISTRIBUTION ☐

Check One: MAINT. ☐ HERBICIDE ☐ SERV. ORDER ☐ CAPITAL W.O. ☐

WK. ENDING_____ SHEET _____ OF _____

SUB NAME & NUMBER _____ CIRCUIT _____ TOWN_____

CONTRACTOR_____ CREW FOREMAN_____ INSPECTOR _____ JOINT WITH _____

Treatment Codes CT=Cutting (Re-clearing) RC=Re-claiming MO=Mowing DT=Danger Tree Removal (Indicate # of DT removed in remarks section) WD=Widen FO=Foliar CS=Cut Surface BA=Basal

Chemical Codes 1=Accord Conc. EPA Reg. #62719-324 2=Arsenal Powerline EPA Rog. #241-431 3=Escort XP EPA Reg. #352-439 4=Krenite S EPA Reg. #352-395 5=Garlon 3A EPA Reg. #62719-37 6=Garlon 4 Ultra EPA Reg. #62719-40 7=Stalker EPA Reg. #241-398

DATE	TREAT-MENT	ROAD	VEC LINE #	VEC POLE #S FROM	VEC POLE #S TO	WIDTH	FOOTAGE TREATED	FOOTAGE OPEN	TEL. TREATED	TEL. ROUTE	TELEPHONE POLE #S FROM	TELEPHONE POLE #S TO	FOOTAGE CHIPPED	CHEM CODE	VOL. USED	REMARKS

NAME	POSITION (CODE)	S	M	T	W	T	F	S	TOTAL

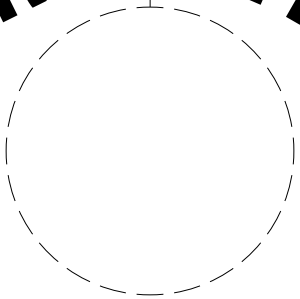
EQUIPMENT	EQUIPMENT #	S	M	T	W	T	F	S	TOTAL
Aerial Device (bucket)									
4X4 Truck									
Ton Truck									
Chipper									
Saw (#)									

Prepared By:_____

Approved By:_____

Exhibit 3

MEMBER NOTIFICATION



Vermont Electric Cooperative, Inc.

42 Wescom Road • Johnson, VT 05656

802-635-2331 • 800-832-2667

TREE WORK SCHEDULED

PLEASE READ

THIS CONCERNS YOUR PROPERTY

VEC is currently conducting vegetation management activities in your area in order to minimize vegetation related interruptions in the utility service to you and your neighbors. VEC's Forestry staff of licensed/certified forester(s)/arborist(s) are responsible for the supervision of qualified line clearance contractors hired to manage vegetation growth around the utility lines.

Line Maintenance generally involves the cutting of all brush (up to 25 ft. on each side of the center of the pole line for distribution lines and up to 50 ft. on each side for transmission lines) to ground level, as well as proper pruning of all branches growing towards conductors and removal of any/all trees, which can not be properly pruned to provide adequate clearance.

Hazard Tree Removal involves the removal of trees, which due to size, location and/or condition, have a potential for damaging the conductors or structures now or within the next ten years. These trees will be removed regardless of distance from the center of the pole line.

If you did not receive this notice in person and would like to discuss this work with the tree company conducting the maintenance, please call the number listed below. If contact is not made within 5 days of receiving this notice, maintenance activities will take place without any further notice.

Crew Foreperson: _____ Date: _____

Contractor: _____

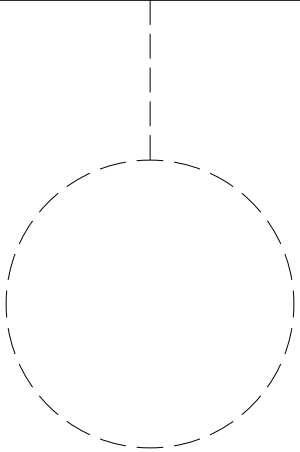
Day Telephone: _____ Evening Telephone: _____

Work Scheduled: ☐ Line Maintenance ☐ Hazard Tree Removal

☐ Distribution ☐ Transmission

Please read the back of this notification for further explanation of VEC Vegetation Management Specifications.

(over)



VEC's Vegetation Management Plan, as submitted to the Vermont Department of Public Service, provides the following specifications:

Minimum Tree-to-Conductor Clearances

Distribution System - A minimum of 10 feet of clearance on each side of the outside conductor and 20 feet of clearance for all branches that overhang the conductors must be achieved. Additional clearance is necessary on branches that could bend (due to snow or ice loading) or break and contact the conductors below.

Transmission System - A minimum of 15 feet of clearance on each side of the outside conductor must be achieved. No branches shall be left overhanging the conductors.

These are the minimum required clearances. Individual tree location, health, species, and growth rate must be considered when determining appropriate/acceptable clearances.

Disposal Procedures

Brush, branches and woody debris from pruning and removal operations along roadsides and within manicured lawns will be chipped. In all other areas, brush will be moved away from the poles, out from under the conductors and windrowed (placed in a long, low heap or pile) off to the side.

Trees, which have been cut remain the property of the landowner and will be left on site. Trees that appear to contain log products will be left in long lengths (except when it is necessary to take them down in smaller sections) and all other wood will be blocked up and piled, unless directed otherwise by the member.

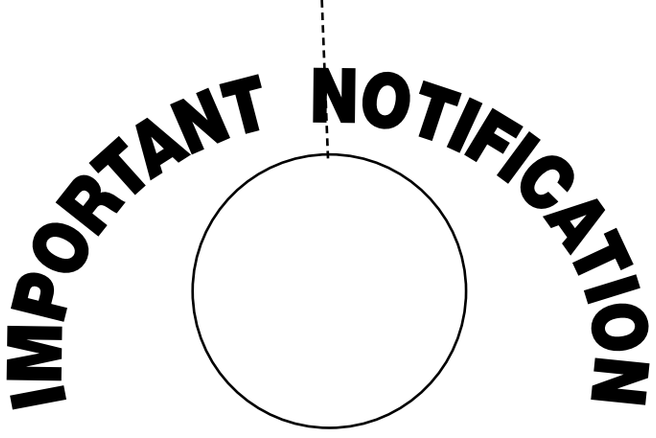
Compatible Species

Plant species which at maturity will not attain a height that will endanger the safe and reliable operation of the line and may provide food and/or cover for wildlife (e.g. apple, lilac, hawthorn, dogwood, etc.) will be retained except in areas immediately surrounding pole locations and directly under conductors.

Please note: maintenance requirements are very site specific and each location must be evaluated individually.

VERMONT ELECTRIC CO OP INC
the co-op advantage
energy smart today

Vermont Electric Cooperative, Inc., a member-owned, not-for-profit Cooperative founded in 1938, is Vermont's second largest electric utility, serving approximately 34,000 members in rural Vermont.



Vermont Electric Cooperative, Inc.

HERBICIDE APPLICATION SCHEDULED

VEC is currently conducting vegetation management activities in your area in order to minimize vegetation related outages. A variety of Integrated Vegetation Management (IVM) methods are used including hand cutting, mowing and selective herbicide application with handheld equipment. Maintenance activities are implemented by certified and experienced contractors under the supervision of VEC's licensed/certified forester(s)/ arborist(s).

Vegetation in close proximity to the electric facilities is not only the leading cause of power outages, but also represents a safety risk to utility workers and the general public.

VEC has selected IVM to promote low-growing, sustainable plant communities that are compatible with the electric facilities and to discourage incompatible plant species which at maturity attain a height of greater than 15 feet tall and may pose a variety of concerns including safety, access, electric service reliability, emergency restoration, regulatory compliance and environmental concerns.

Important benefits of IVM include:

- Increased visibility and access along rights-of-way
- More timely and less costly outage restoration
- Safer working conditions for line workers and line clearance contractors
- Improved species selectivity
- Long-term control
- Promotes stable plant communities
- Supports natural (biological) control
- Promotes bio-diversity among plants and wildlife
- Only feasible control method for invasive species
- Only method that lowers undesirable stem densities, reducing future maintenance costs
- Most efficient and economical control

Use of herbicides within our IVM approach is regulated by federal and state statutes and regulations which protect sensitive areas such as surface waters and public and private water supplies.

All products to be used are federally registered and labeled for specific uses by the Environmental Protection Agency (EPA) and will be applied by certified applicators according to product label directions. Product applications will be selective, in that the herbicide will be applied directly to incompatible species of plants.

If you have a private water supply that is within 100 feet of the right-of-way, please call the contractor designated below:

The contractor conducting maintenance in your area is:

_____

The contractor's representative is:

_____

and may be contacted at:

_____

The electric company identification for the right-of-way is:

_____

We at VEC believe our IVM approach to vegetation management is the most responsible way to provide safe and reliable electric service at a reasonable cost. We would be happy to answer any questions you may have as this work is carried out.

Vermont Electric Cooperative, Inc.
42 Wescom Road, Johnson, VT 05656
1-800-832-2667 or 802-635-2331
www.vermontelectric.coop

Exhibit 4

Vermont Electric Cooperative, Inc.
Vegetation Maintenance
Utility Initiated Outage Request Form

Date: _____

Company Name: _____

Substation Name and #: _____

Point #: _____

Town: _____

Outage Time Required: _____

Desired Date(s) and Time(s) of Outage: _____

Contractor Comments:

_____
_____
_____
_____
_____

Internal Use Only – Do Not Write Below This Point

VEC Forestry Comments:

_____
_____
_____
_____
_____

VEC Line Department/Scheduling Comments:

_____
_____
_____
_____
_____

Date and Time of Scheduled Outage: _____

Exhibit 5

Vermont Electric Cooperative, Inc.
42 Wescom Rd.
Johnson, Vermont 05656
(802) 635-2331 800-832-2667

LINE CLEARANCE CONTRACTOR JOB BRIEFING FORM

INITIALS | TIME

DATE: : : :

WO/SO: (IF APPLICABLE) AM / PM AM / PM AM / PM

CONTRACTOR:

PERSON IN CHARGE:

EMERGENCY INFORMATION

EMERGENCY MEDICAL SERVICES: 911

CONTROL: 730-1219 EMERGENCY: 635-9519

911 ADDRESS (*Nearest To Worksite*):

(If None - LIST DIRECTIONS TO SITE ON BACK)

TOWN:

FIRST AID KIT: Y / N FIRE EXT: Y / N

CELL SERVICE Y / N RADIO CHANNEL:

LINE/POLE # (s)	JOB DESCRIPTION

VEC STAFF /OTHER CREWS

ANSI Z133.1-2006 MINIMUM APPROACH DISTANCES TO ENERGIZED CONDUCTORS FOR QUALIFIED LINE CLEARANCE ARBORISTS & QUALIFIED LINE CLEARANCE ARBORIST TRAINEES

Nominal Voltage in Kilovolts (kV) Phase to Phase	Minimum Approach Distance	Elevation Factor Sea Level-5000ft. MAD meters
0.051 to 0.3	*Avoid Contact*	
0.301 to 0.75	1' 01"	0.33
0.751 to 15.0	2' 05"	0.70
15.1 to 36.0	3' 00"	0.91
36.1 to 46.0	3' 04"	1.01

NOTE: Minimum approach distances to energized conductors for persons other than qualified line clearance arborists & qualified line clearance arborist trainees is as follows:

kV Phase to Phase	Dist.	Elev. Factor
0.0 to 50.0	10' 00"	3.05 m

JOB BRIEFING REQUIREMENTS

BRIEF DESCRIPTION/NOTES

ENERGY SOURCE CONTROLS

- ☐ Nominal Voltage _____
- ☐ Min. Approach Dist. _____
- ☐ Substation _____
- ☐ Protective Device _____
- ☐ Energized Equipment _____
- ☐ Tested/Dead/Grounded
- ☐ Scheduled Outage
- ☐ Emergency Outage
- ☐ Storm Response
- ☐ Other _____

JOB HAZARDS REVIEW

- ☐ Eectricity
- ☐ Utility Hardware Condition
- ☐ Sagging Conductors
- ☐ Vegetation Touching Conductors
- ☐ Vegetation w/in Min. Approach Dist.
- ☐ Tree Condition
- ☐ Included Bark
- ☐ Overhangs/Deadwood
- ☐ Wood Under Tension
- ☐ VehicleTraffic
- ☐ Pedestrian Traffic
- ☐ Ground Condition
- ☐ Equipment/Tools in Use
- ☐ Weather/Temperature
- ☐ Sun Glare
- ☐ Dehydration
- ☐ Wildlife (dogs,insects,etc.)
- ☐ Poisonous Plants
- ☐ Railroads
- ☐ Water
- ☐ Fences
- ☐ Equipment Inspection
- ☐ Tool(s)/Gear Inspection
- ☐ Other _____

WORK PROCEDURES

- ☐ Assign Tasks
- ☐ Communications
- ☐ Establish Work Zone
- ☐ Plan Escape Routes
- ☐ Identify Drop Zones
- ☐ Traffic Control Setup
- ☐ Distribution Work
- ☐ Transmission Work
- ☐ Storm Response
- ☐ Pruning
- ☐ Tree Felling
- ☐ Tree Climbing
- ☐ Flat Cutting
- ☐ Bucking & Limbing
- ☐ Rigging/Roping
- ☐ Dragging Brush
- ☐ Review Emergency Response Procedures
- ☐ Chipping Brush
- ☐ Lifting
- ☐ Non-Conductive Tool(s)
- ☐ Aerial Lift
- ☐ Power Saws
- ☐ Specialized Equipment
- ☐ Mixing Crews (see back)
- ☐ Pre-Scope Meeting
- ☐ Other _____

SPECIAL PRECAUTIONS

- ☐ Equipment Safety
- ☐ On Site First Aid/CPR
- ☐ Public/Traffic Safety
- ☐ Weather Precautions
- ☐ Fire Suppression
- ☐ Overhead Hazards
- ☐ Terrain Hazards
- ☐ Special Protection Areas
- ☐ Water Safety
- ☐ Railroad Safety
- ☐ Water Ways/Wetlands
- ☐ Property Damage
- ☐ School Zones
- ☐ Pedestrians
- ☐ Outriggers Placement
- ☐ Lighting for Night Work
- ☐ Load Securement
- ☐ Equipment Inspection
- ☐ Tool(s)/Gear Inspection
- ☐ Wheel Chocks Set
- ☐ No Loose Clothing/Chains
- ☐ Location called in to Control
- ☐ Pager on-person/battery ck.
- ☐ Special Worker Concerns (hearing, fatigue, allergies, etc.)

PERSONAL PROTECTIVE EQUIPMENT (PPE) REVIEW

- ☐ Hard Hat
- ☐ Safety Glasses
- ☐ Re-inforced Toes
- ☐ Gloves
- ☐ Hearing Protection
- ☐ Leg Protection
- ☐ Fall Protection
- ☐ Reflective Safety Vest
- ☐ Face Shield/Googles
- ☐ Other _____
- ☐ Other _____
- ☐ Other _____

NOTE: IS THE CREW ABLE TO SAFELY PERFORM THE JOB? ☐ **YES** ☐ **NO**

IF THE JOB CANNOT BE PERFORMED SAFELY --- STOP THE JOB --- AND ASK FOR ASSISTANCE!

STOP · THINK · ACT · REVIEW

DIRECTIONS TO SITE

(Complete Directions to Site when 911 Address is not available)

SPECIAL DISCUSSION

(To be conducted whenever multiple crews are working together or in close proximity to one another)

- ☐ WHO CAN CLIMB:
- ☐ CREW MEMBER QUALIFICATIONS:
- ☐ CAPABILITIES OF EACH CREW'S EQUIPMENT:
- ☐ IDENTIFY/DEFINE WORK ZONE(S):
- ☐ ESTABLISH DROP ZONE(S):
- ☐ JOB SCOPE OF EACH CREW:
  (WHO is doing WHAT and HOW)

AUDIT REVIEW

☐ FOLLOW UP REVIEW - COMMENTS:

REVIEWED BY SUPERVISOR:	DATE:
REVIEWED BY VEC:	DATE:

PHONETIC ALPHABET

A	ALPHA	N	NOVEMBER
B	BRAVO	O	OSCAR
C	CHARLIE	P	PAPA
D	DELTA	Q	QUEBEC
E	ECHO	R	ROMEO
F	FOXTROT	S	SIERRA
G	GOLF	T	TANGO
H	HOTEL	U	UNIFORM
I	INDIA	V	VICTOR
J	JULIET	W	WHISKEY
K	KILO	X	X-RAY
L	LIMA	Y	YANKEE
M	MIKE	Z	ZULU

ALWAYS USE
3 WAY COMMUNICATION

REMINDER:

*ASKING US TO OVERLOOK A **SINGLE** SAFETY VIOLATION WOULD BE ASKING US TO **COMPROMISE** THE VALUE WE HAVE PLACED ON YOUR **LIFE**!*

Exhibit 6

Vermont Electric Cooperative, Inc.
Qualified Line Clearance Contractor
Safety Observation Report

Date: _____ Time _____

Description of Job Being Performed: _____

Location of Observation: _____ By: _____

Crew Foreperson Observed: _____

Worker 1 Observed: _____

Worker 2 Observed: _____

Worker 3 Observed: _____

Please check the boxes below. Include a brief description of the discrepancy for each "No" answer on the back of this form. If auditing "Work Methods" describe activities.

		Crew Foreperson			Worker 1			Worker 2			Worker 3		
PERSONAL SAFETY	**Ref. 1910**	**Yes**	**No**	**N/A**	**Yes**	**No**	**N/A**	**Yes**	**No**	**N/A**	**Yes**	**No**	**N/A**
1. Hard Hat	.135	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
2. Safety Glasses	.133	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
3. Appropriate Workboots	.136	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
4. Gloves	.132	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
5. Appropriate Clothing	.269 (l)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
6. Fall Protection	.269(r)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
7. Safety Vest In Work Zone	MUTCD	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
8. Face Shield or Goggles	.133	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
9. Hearing Protection	.95	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
10. Personal Flotation Vest	.269 (w)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
11. Appropriate Leg Protection	.269 (g)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
12. Required Training Current	App A	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
13. Qualification Forms On File	App A	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
14. Knowledge of													
a) Nominal Voltage	.269 (r)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
b) Min. Approach Distances.	.269 (r)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
c) Distinguish Live Parts	.269 (r)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

WORK AREA SAFETY	**Ref. 1910**	**Yes**	**No**	**N/A**	**Comments**
15. Pre-job Safety Briefing	.269 (c)	☐	☐	☐	If yes, √ and detail discussion
a) Hazards		☐			_____
b) Procedures		☐			_____
c) Special Precautions		☐			_____
d) Personal Protective Equip		☐			_____
e) Energy Source Control		☐			_____

Vermont Electric Cooperative, Inc.
Qualified Line Clearance Contractor
Safety Observation Report

16. Safe & Clean Working Environment		☐	☐	☐	☐	_____
17. Insulated Tools Clean & Serviceable	.269 (j)	☐	☐	☐	☐	_____
18. First Aid Kit	.151	☐	☐	☐	☐	_____
19. Fire Extinguisher	.157	☐	☐	☐	☐	_____

VEHICLES	**Ref. 1910**	**Yes**	**No**	**N/A**	**Comments**	
20. Proper Traffic Control	MUTCD	☐	☐	☐	☐	_____
21. Arrival Called into Dispatch		☐	☐	☐	☐	_____
22. Wheel Chocks Set	.67	☐	☐	☐	☐	_____
23. Outriggers Set	.67	☐	☐	☐	☐	_____
24. Vehicle Condition	.67	☐	☐	☐	☐	_____
25. Pre-Flight Aerial Lift Checks	.67	☐	☐	☐	☐	_____

WORK METHODS OBSERVED	**Ref. 1910**	**Yes**	**No**	**N/A**	**Comments**	
26. 2nd Person Present within voice	.269 (r)	☐	☐	☐	☐	_____
27. Use of Insulated Tools	.269 (r)	☐	☐	☐	☐	_____
28. Use of Aerial Lifts	.269 (r)	☐	☐	☐	☐	_____
29. Tree Felling	.269 (r)	☐	☐	☐	☐	_____
30. Pruner Operations	.269 (r)	☐	☐	☐	☐	_____
31. Climbing Trees/Pre-climb Inspection	.269 (r)	☐	☐	☐	☐	_____
32. Use of Power Saws	.269 (r)	☐	☐	☐	☐	_____
36. Use of Brush Chippers	.269 (r)	☐	☐	☐	☐	_____
37. Proper Roping and Rigging	.269 (r)	☐	☐	☐	☐	_____

Ref. #	**Description Of Discrepancy (Include Employee Name For Personal Safety Issues)**
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Exhibit 7

Herbicide Application
Property Owner Notification Log

Line Name: _____ Structure No.'s: _____

Town: _____ Road: _____

Contractor: _____ Crew Member: _____

Property Owner: _____ Phone: _____

Date of Contact: _____ Time of Contact: _____ Form of Contact: _____

Summary of Conversation: _____

Actions Taken: _____

Additional Comments: _____

PART TWO:
HERBICIDE ACCIDENTAL RELEASE MEASURES

I. SCOPE

VEC Operating Procedure No. 27 – Part Two: Herbicide Accidental Release Measures, establishes a procedure for personal precautions, controlling, containing, clean up and reporting of any accidental release of pesticide during application for vegetation maintenance on Vermont Electric Cooperative, Inc. (herein referred to as VEC) transmission and distribution line rights-of-ways in accordance with the State of Vermont, Title 6 V.S.A., Chapter 87

Measures taken in response to an accidental release clean up will conform to EPA Worker Protection Standard 40 CFR Part 170.240 regarding Personal Protective Equipment as follows:

170.240 Personal protective equipment.

(a) Requirement. Any person who performs tasks as a pesticide handler shall use the clothing and personal protective equipment specified on the labeling for use of the product.

(b) Definition. (1) Personal protective equipment (PPE) means devices and apparel that are worn to protect the body from contact with pesticides or pesticide residues, including, but not limited to, coveralls, chemical-resistant suits, chemical-resistant gloves, chemical-resistant footwear, respiratory protection devices, chemical-resistant aprons, chemical-resistant headgear, and protective eyewear.

Measures taken in response to an accidental release clean up will conform to Vermont Act 31, relating to Community and Worker Right-to-Know of 1985 as follows:

1. Emergency Actions

A person responsible for the application, storage or handling of a pesticide upon knowledge of an accident involving such pesticide shall immediately take actions intended to protect human health and the environment, including but not limited to emergency containment measures and notification as described within this section.

2. Emergency Notification

a. All Class A, B and C Dealers, certified commercial and noncommercial applicators, certified private applicators, licensed pesticide applicator companies, pesticide producing establishments and persons working for licensed applicator companies under the supervision of a certified applicator, shall report pesticide accidents immediately by telephone to either the:

Vermont Department of Agriculture, Food and Markets Plant Industry Section
116 State Street, Drawer 20
Montpelier, VT 05620-2901
(802) 828-2431

OR

Vermont Department of Public Safety
Waterbury State Complex
103 South Main Street
Waterbury, VT 05676
1-800-641-5005 (operating 24 hours; 7 days/week)

II. ACCIDENTAL RELEASE MEASURES

In the event of an accidental herbicide release, stabilize the situation. If the product is leaking from a drum or tank, then action shall be taken to stop this flow by changing the position of the barrel or tank, shutting off a valve or up-righting the container. Isolate and dike the spill area preventing material from entering sewers, waterways or low areas. The following are the Manufactures MSDS directions for accidental release clean up.

FOSAMINE AMMONIUM: (Krenite S)

ACCIDENTAL RELEASE CLEAN UP

Soak up spill with sawdust, sand, oil dry or other absorbent material. Shovel or sweep up. Never return to container for reuse. Scoop the absorbed material into bags or boxes with a plastic or aluminum shovel.

If spill area is on ground near valuable plants or trees, remove top 2 inches of soil after initial cleanup.

GLYPHOSATE: (Accord Concentrate Herbicide)

ACCIDENTAL RELEASE CLEAN UP

Absorb spills with an inert absorbent material such as Hazorb, Zorball, sand or dirt.

IMAZAPYR: (Arsenal/Stalker/Habitat)

ACCIDENTAL RELEASE CLEAN UP

Absorb spills with a suitable absorbent material. Place into suitable containers for disposal in a licensed facility. After decontamination, spill area can be washed with water. Collect wash water for approved disposal.

METSULFURON METHYL: (Escort XP)

ACCIDENTAL RELEASE CLEAN UP

Shovel or sweep up.

TRICLOPYR: (Garlon 3A & 4)

ACCIDENTAL RELEASE CLEAN UP

Absorb spills with an inert absorbent material such as Hazorb, Zorball, peat moss, commercial sweeping compound or similar absorbent material. If these are not available use absorbing agents such as kitty litter, sand, clay or topsoil, sand or dirt. Store collected absorbed material in secure containers until safe disposal can be arranged. Small spills on topsoil should be worked into the soil and allowed to degrade under natural conditions.

III. FIRST AID

In the event of herbicide poisoning or contamination, emergency measures described on the product label shall be taken immediately. As soon as these instructions have been completed, a doctor should be notified. It is important to provide a label for the doctor's reference so he will be able to determine the appropriate treatment.

The following is the contact information for the Vermont Poison Control Center:

Vermont Poison Center
Fletcher Allen Health Care
111 Colchester Ave.
Burlington, Vermont 05401
(802) 658-3456

IV. REPORTING RESPONSIBILITIES

In the event of an accidental herbicide release, contact the following:

Vermont Department of Agriculture:
802-828-2431 (during work hours)

Vermont Department of Public Safety:
1-800-641-5005 (after work hours)

VEC Manager of Forestry, Sara Packer:
Office 802-730-1104
Pager 802-741-1972
Cell 802-254-1458

VEC Chief Operating Officer, Jeffrey Wright:
Office 802-730-1170
Pager 802-741-1370
Cell 802-730-4233

Revision History

Rev No.	Date	Description

Approval (Latest Revision)

Prepared by	Approved by
X:	X:
Date:	Date:

Distribution List (Hard Copy)

Company	Title

Distribution List (Email “PDF” Copy)

Company	Title

Procedure Review Schedule

Refer to VEC Operating Procedure OP-51 for the operating procedure review schedule.

Appendix E

VERMONT ELECTRIC COOPERATIVE, INC.
VEGETATION MANAGEMENT FIELD INSPECTION REPORT

CONTRACTOR:_____ FOREPERSON:_____ DATE:_____

SUBSTATION: _____ DISTRICT:_____ TOWN(S):_____

ROAD(S):_____ INSPECTOR:_____

GENERAL PERFORMANCE -VEC SPECIFICATIONS

0 = Not Checked-N/A 1 = Poor 2 = Fair 3 = Good 4 = Very Good

**** More than one rating of 1 requires Contractor signature and corrective action plan***

	0	1	2	3	4
Proper cuts to outside branch collar, not flush or stubs, correct angle					
Cuts to proper laterals, directional pruning					
Quantity removed no more than 1/3 crown, only healthy trees pruned					
No bark rips, tears, excess wounding					
No branches, limbs or tops left hanging in trees					
Tree shape and overall appearance acceptable					
Clearance to specifiactions (Consider member limitation only if noted on maintenance report)					
All deadwood and weakened tree parts removed if posing threat to primary line					
Danger trees effectively identified and removed					
Stump height 3 inches or less and cut parallel with ground grade (no "pongee stakes")					
Disposal procedures consistent with specifications					
Windrows 4' high or less & not interfering w/ roads, trails, streams or property lines; 20' firebreak every 500'					
Preservation of low-growing desirable species					
Vines cut at ground level					
Water quality protection, no discharge of organic material or petroleum products; water supplies undisturbed					
Fences & stonewalls preserved or restored, gates & fences kept closed, blazed property lines maintainec					
Erosion Control - rutting avoided or repaired, waterbars installed where necessary					
Housekeeping, work site cleanup					
Copy of clearance standards and specifications					
Maintenance reports complete and legible					
Invoices accurately reflect work conducted on the ground					
Project map marked and current					
Certified herbicide applicator w/in voice command of physical herbicide application					
Herbicide application certification up to date and present					
Herbicide application to spec (entire length/width of identified treatment area is treated & buffers maintained)					
Appropriate herbicide equipment/container storage (spill/leak proof & lockable, secured when unattended)					
Herbicide permit, label(s) and material safety data sheet(s) on site					
Herbicide spill kit, spill response instructions, drinking water and wash water on site					
Herbicide application property owner notification log current, legible and adequate					

COMMENTS

_____

_____

_____

_____

_____

Contractor Signature:_____ Contract Supervisor Signature:_____

Appendix F

VERMONT ELECTRIC COOPERATIVE, INC.
OVERHEAD UTILITY EASEMENT

KNOW ALL PEOPLE BY THESE PRESENTS, THAT I/we_____ (hereinafter called the "Grantor," whether one or more), for and in consideration of the sum of One Dollar and other valuable consideration paid by Vermont Electric Cooperative, Inc., a corporation duly organized under the laws of the State of Vermont (hereinafter together called the Grantees), the receipt whereof is hereby acknowledged, do hereby GIVE, GRANT, BARGAIN, SELL and or CONVEY unto the said Grantee, their successors and assigns a utility easement, fifty feet (50) in width, over, above, across, through and under Grantor's land, together with the right to enter upon the land of the Grantor for the purposes of exercising any of the rights herein granted, said land being situated in the Town of _____, State of Vermont, more particularly described as follows:

Being the same land and premises conveyed to the Grantor herein by _____, by, (Warranty) (Quitclaim) (Administrator) Deed Dated _____and recorded in Book_____, Page _____of _____Land Records, consisting of _____acres, more or less, and bound on the north by land now or formerly owned by _____ : on the east by land now or formerly owned by _____: the south by land now or formerly owned by _____ : the west by land now and formerly owned by _____:

The easement shall be described as follows: Grantees may place, construct, reconstruct, operate, repair, maintain, improve, mark, replace thereon, and remove therefrom, and in or upon all streets, roads or highways abutting said land, electric, communications and data transmission and distribution systems consisting of poles, wires, cables, conduits, equipment and other fixtures and appurtenances used or adopted for the purpose, upon, over, though, across and under the surface of the land owned by the Grantor. Grantees may also cut and prune and apply herbicide to all trees and vegetation to the extent necessary as determined by the Grantees to protect the said systems and keep the systems clear of the growth. Together, also, with the permanent right at any and all times to enter on adjacent lands of the Grantor and to cut or prune and remove such trees growing outside the limits of the Easement Area (Danger trees) which may, in the opinion of the Grantees interfere with or be likely to interfere with the successful operation of the facilities now or hereafter to be constructed on said Easement Area. The decision for final location of the easement shall be made by the Grantees and shall become permanent upon the construction of utility Systems.

The Grantor covenants for themselves, their heirs and assigns as follows: 1) not to place any structures within twenty-five (25) feet of the Systems which shall establish the center of the easement herein conveyed; 2) that no obstructions of any kind shall be allowed or suffered by the Grantor, their heirs and or assigns in or upon the easement herein conveyed; 3) no grade changes in and to the herein conveyed easement shall be made without the prior written consent of Grantees; and 4) no trees or other vegetation which grow to a mature height of more than 15 feet shall be planted within the herein conveyed easement and no trees or vegetation which grow to a mature height of less than 15 feet shall be planted within 15 feet of a pole.

TO HAVE AND TO HOLD the above granted rights and easements, with all privileges and appurtenances thereunto belonging, unto the said Grantees, their successors and assigns forever, to them and their own proper use, benefit and behoof. Grantor covenants with the Grantees that at and until the ensealing of these presents the Grantor is well seized of said premises as a good indefeasible estate in fee simple, and has good right to sell and convey the rights and easements aforesaid in the manner and form above written, and that the same are free from all encumbrances whatsoever, and furthermore, the Grantor agrees to warrant and defend the same to the Grantees and their successors and assigns forever against all claims and demands whatsoever.

IN WITNESS WHEREOF, the undersigned has set their hand and seal this _____day of _____, _____year.

In the presence of:

Witness_____ Grantor _____

Witness_____ Grantor _____

State of _____

_____County, _____

At _____, in said County, on this ___ day of _____, _____, personally appeared _____ and he/she acknowledged this instrument, by him/her sealed and subscribed, to be his/her free act and deed.

Before me,

_____
Notary Public
My Commission Expires:

To be completed by VEC

W.O. #_____Pole #_____Acct. # _____

Name on Acct _____ 911 Address _____

Appendix G

Incompatible Vegetation

Common Name	Scientific Name	Mature Height
Ash (White, Green)	Fraxinus	50 - 80'
Aspen (Bigtooth, Quaking)	Populus	40 - 70'
Beech (American, European)	Fagus	50 - 80'
Birch (Black, Yellow, White, Grey, River)	Betula	30 - 70'
Boxelder	Acer	40 - 70'
Butternut	Juglans	40 - 70'
Catalpa	Catalpa	50 - 90'
Cedar (White)	Thuja	40 - 60'
Cherry (Black, Pin)	Prunus	50 - 90'
Common Witchhazel	Hamamelis	20 - 30'
Cottonwood	Populus	75 - 100'
Eastern Redbud	Cercis	20 - 30'
Elm (American, Chinese)	Ulmus	40 - 90'
Fir (Balsam, White)	Abies	50 - 80'
Ginko	Ginko	50 - 80'
Hemlock	Tsuga	50 - 80'
Hickory (Bitternut, Pignut, Shagbark)	Carya	50 - 80'
Honeylocust	Gleditsia	30 - 70'
Hop Hornbeam	Ostrya	30 -50'
Juniper (Eastern Red Cedar)	Juniperus	40 - 50'
Larch	Larix	40 - 80'
Linden (American, Littleleaf)	Tilia	60 - 80'
Locust (Black)	Robinia	50 - 80'
Lombardy Poplar	Populus	40 - 50'
Maple (Sugar, Red, Silver, Norway*)	Acer	40 - 90'
Mountainash (European, Korean)	Sorbus	20 - 50'
Oak (Red, White, Black, Pin)	Quercus	50 - 90'
Pine (White, Red, Scotch, Austrian)	Pinus	40 - 100'
Spruce (Red, Black, White, Blue, Norway)	Picea	50 - 90'
Sycamore	Platanus	75 - 100'
Walnut (Black)	Juglans	50 - 75'
Willow (Weeping, White)	Salix	40 - 90'

Dirr, Michael A. Manual of Woody Landscape Plants: Their Identification, Ornamental Characteristics Culture, Propagation and Uses. Champagne, IL, 1998.

Appendix H

Compatible Vegetation

Wire Zone (area under the conductors and 15 feet outside of the conductors on each side)

Common Name	Scientific Name	Mature Height
American Elder	Sambucus	5 - 12'
Azalea (Pinksterbloom, Swamp)	Rhododendron	2 - 10'
Barberry (Common, Japanese*)	Berberis	3 - 10'
Bearberry	Arctostaphylos	6 -12'
Black Elderberry	Sambucus	12 -15'
Canadian Yew	Taxus	3 - 6'
Chokeberry (Red, Black)	Aronia	6 - 10'
Common Ninebark	Physocarpus	5 - 10'
Common Privet	Ligustrum	12 - 15'
Common Winterberry/Inkberry	Ilex	6 - 10'
Dogwood (Silky, Roughleaf, Redosier)	Cornus	6 -15'
Flowering Crab Apple	Malus	8 - 12'
Hazelnut (American, Beaked)	Corylus	8 - 15'
Honeysuckle*	Lonicera	4 - 8'
Hydrangea (Smooth, Bigleaf, Oakleaf)	Hydrangea	3 - 8'
Junipers (Common, Creeping)	Juniperus	1 - 10'
Laurel (Mountain, Sheep)	Kalmia	1 - 15'
Leatherleaf	Chamaedaphne	2 - 5'
Lilac (Common, Late)	Syringa	6 - 15'
Mountain Holly	Nemopanthus	6 - 10'
Northern Bayberry	Myrica	5 - 12'
Rhododendron	Rhododendron	3 - 6'
Roses	Rosa	2 - 10'
Rubus (Rasberries, Blackberries, Dewberries)	Rubus	3 - 10'
Smokebush	Cotinus	10 - 15'
Spicebush	Lindera	6 - 12'
Spirea	Spirea	3 - 8'
Sweetfern	Comptonia	2 - 4'
Viburnum (Arrowwood, Cranberry)	Viburnum	6 - 15'

Border Zone (area outside the wire zone, extending to the outside edge/treeline on each side)

Common Name	Scientific Name	Mature Height
Maple (Mountain, Striped)	Acer	10 - 30'
American Hornbeam	Carpinus	20 - 30'
American Mountain Ash	Sorbus	30 - 40'
Apple (Common, Crab)	Malus	10 - 30'
Autumn-olive	Elaeagnus	12 - 18'
Buckthorn (Common, Glossy*)	Rhamnus	12 - 25'
Common Chokecherry	Prunus	20 - 30'
Dogwood (Gray, Pagoda, Flowering)	Cornus	10 - 30'
Eastern Redbud	Cercis	20 - 30'
Hawthorn	Crataegus	15 - 25'
Hydrangea (Panicle)	Hydrangea	10 - 20'
Japanese Tree Lilac	Syringa	20 - 30'
Serviceberry/Shadbush	Amelanchier	15 - 25'
Speckled Alder	Alnus	15 - 25'
Sumac	Rhus	15 - 25'
Willow (Pussy, Purple, Shining)	Salix	13 - 25'
Winged Euonymus/Burning Bush	Euonymus	10 - 20'
Witchhazel (Coomon, Vernal)	Hamamelis	10 - 30'

*** Indicates species with invasive tendencies in the state of Vermont**

Dirr, Michael A. Manual of Woody Landscape Plants: Their Identification, Ornamental Characteristics Culture, Propagation and Uses. Champagne, IL, 1998.

Appendix I

Outage History Report

Outage	Time Off	Time On	Duration	Type	Map Loc.	Cause	Equip	Sub	Feeder	Phase	Line Sect	Nbr Out	Weather	Temp	Windy	Major Storm

Appendix J

VERMONT ELECTRIC COOPERATIVE, INC.
LINE WORKER'S REPORT

MEMBER NAME _____ DATE _____

SUBSTATION _____ PHASE_____ DEVICE _____

911 ADDRESS _____ TOWN _____

☐ TRANSMISSION ☐ DISTRIBUTION ☐ OUTAGE ☐ NO OUTAGE

POLE # _____RED TAG # _____YELLOW TAG #_____WHITE TAG #_____

DATE/TIME OFF _____ DATE/TIME ON _____

METER LOCATION

☐ HOUSE/STRUCTURE ☐ POLE ☐ 5 WIRE LOOP (MOP) ☐ OTHER _____

WIRE TYPE

☐ **OVERHEAD** ☐ PRIMARY ☐ SERVICE WIRE

SIZE _____ ☐ BARE WIRE ☐ TREE WIRE ☐ COATED ☐ OPEN WIRE ☐ TRIPLEX

☐ ALUMINUM ☐ COPPER ☐ AAA ☐ ACSR OTHER_____

☐ **UNDERGROUND** ☐ DIRECT BURIED ☐ IN CONDUIT ☐ 175 ML ☐ 220 ML SIZE_____

DEFINITION OF TROUBLE

☐ **1** TREE ☐ **2** WEATHER ☐ **3** VEC INITIATED ☐ **4** EQUIPMENT FAILURE ☐ **5** OPERATOR ERROR

☐ **6** ACCIDENT ☐ **7** ANIMAL ☐ **8** POWER SUPPLIER ☐ **9** NON-UTILITY POWER SUPPLIER

☐ **10** OTHER _____ ☐ **11** UNKNOWN

SUPPORTING INFORMATION

*****Only complete section that cooresponds with the definition of trouble checked off above*****

1 TREE: SPECIES _____ DIAMETER_____ DIST. FM. CENTER POLE LINE _____

☐ TREE ☐ BRANCH(ES) ☐ DEAD ☐ ALIVE ☐ LINE DOWN ☐ HARD CONTACT

☐ INSIDE ROW ☐ OUTSIDE ROW ☐ SNAPPED OFF ☐ UPROOTED ☐ BRUSHING CONDUCTORS

☐ WIND ☐ LIGHTNING ☐ SNOW/ICE (UN)LOADING ☐ LINE MAINT. ERROR

ROW CONDITION ☐ VERY POOR ☐ POOR ☐ AVERAGE ☐ GOOD ☐ VERY GOOD

2 WEATHER: ☐ WIND ☐ RAIN ☐ LIGHTNING ☐ SNOW ☐ ICE OTHER _____

3 VEC INITIATED: ☐ ROW MAINT. ☐ SUB MAINT. ☐ LINE MAINT. ☐ MEMBER REQUEST

☐ STORM CLEAN-UP OTHER _____

4 EQUIP. FAILURE: ☐ CUT-OUT ☐ INSULATOR ☐ TRANSFORMER ☐ REGULATOR ☐ CT

☐ DISCONNECT ☐ CONDUCTOR ☐ RECLOSER ☐ BREAKER ☐ SWITCH ☐ BYPASS ☐ PT

☐ ARRESTER OTHER_____

8 POWER SUPPLIER: ☐ CVPS ☐ GMP ☐ VELCO ☐ HYDRO QUEBEC

5, 6, 7, 9 OR 10: TYPE/EXPLANATION _____

FOLLOW UP: ☐ SERVICE ORDER ☐ WORK ORDER ☐ ROW CREW ☐ MEMBER CONFLICT

☐ ADDITIONAL EQUIPMENT/TYPE_____ OTHER _____

☐ INVOICE MEMBER ☐ YELLOW SHEET COMPLETED ESTIMATED # MEMBERS AFFECTED _____

SYSTEM OPERATOR _____ CREW_____

TIME DISPATCHED_____ LOCATION _____ WEATHER _____

REMARKS _____

Appendix K

Literature Cited

Browning, D.M. “Vegetation Management Manual”, National Rural Electric Cooperative Association (NRECA), Cooperative Research Network (CRN), 2000.

Dickinson, D. “Central Vermont Public Service Corporation (CVPS) Distribution Right-of-Way Management Plan”, 2003.

Dickinson, D. “Central Vermont Public Service Corporation (CVPS) Transmission Right-of-Way Management Plan”, 2003.

Green, J.D., Hartman, J.R., Johnson, M.P., Primus, J.E., Spatcher, D.L. and Wheeler, W.C., Jr. “Training Manual for Right-of-Way Vegetation Management”, University of Kentucky College of Agriculture Cooperative Extension Service.

Kempter, G. “Best Management Practices Utility Pruning of Trees”, The International Society of Arboriculture, 2004.

Shigo, A. "Pruning Trees Near Electric Utility Lines", Shigo and Trees Associates, 1990.

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Vermont Electric Cooperative, Inc.

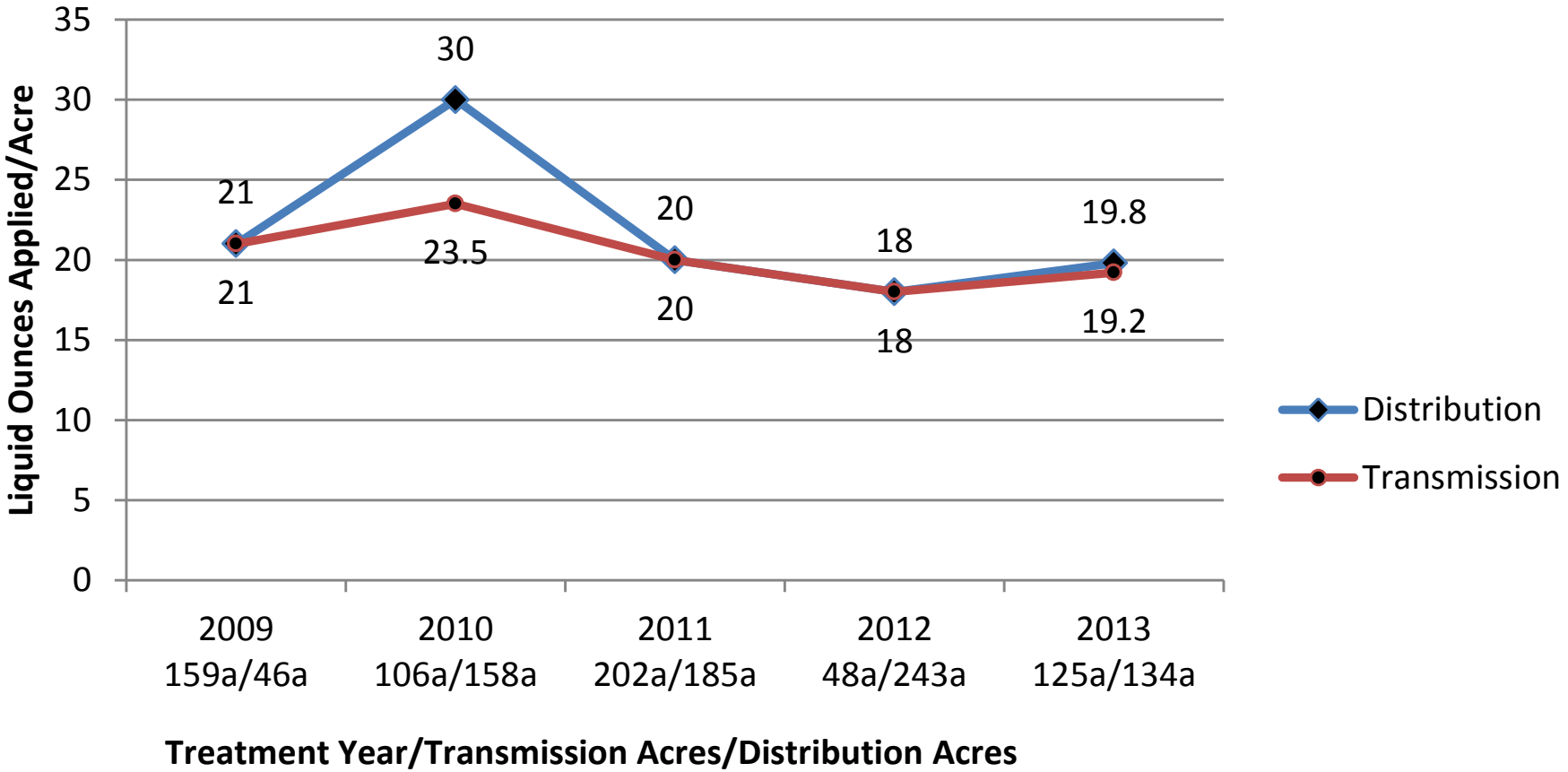
Transmission & Distribution Utility Corridor

Historical Herbicide Use Data

2009-2013

VEC ROW Herbicide Use History

Glyphosate & Imazapyr from VCS use reports

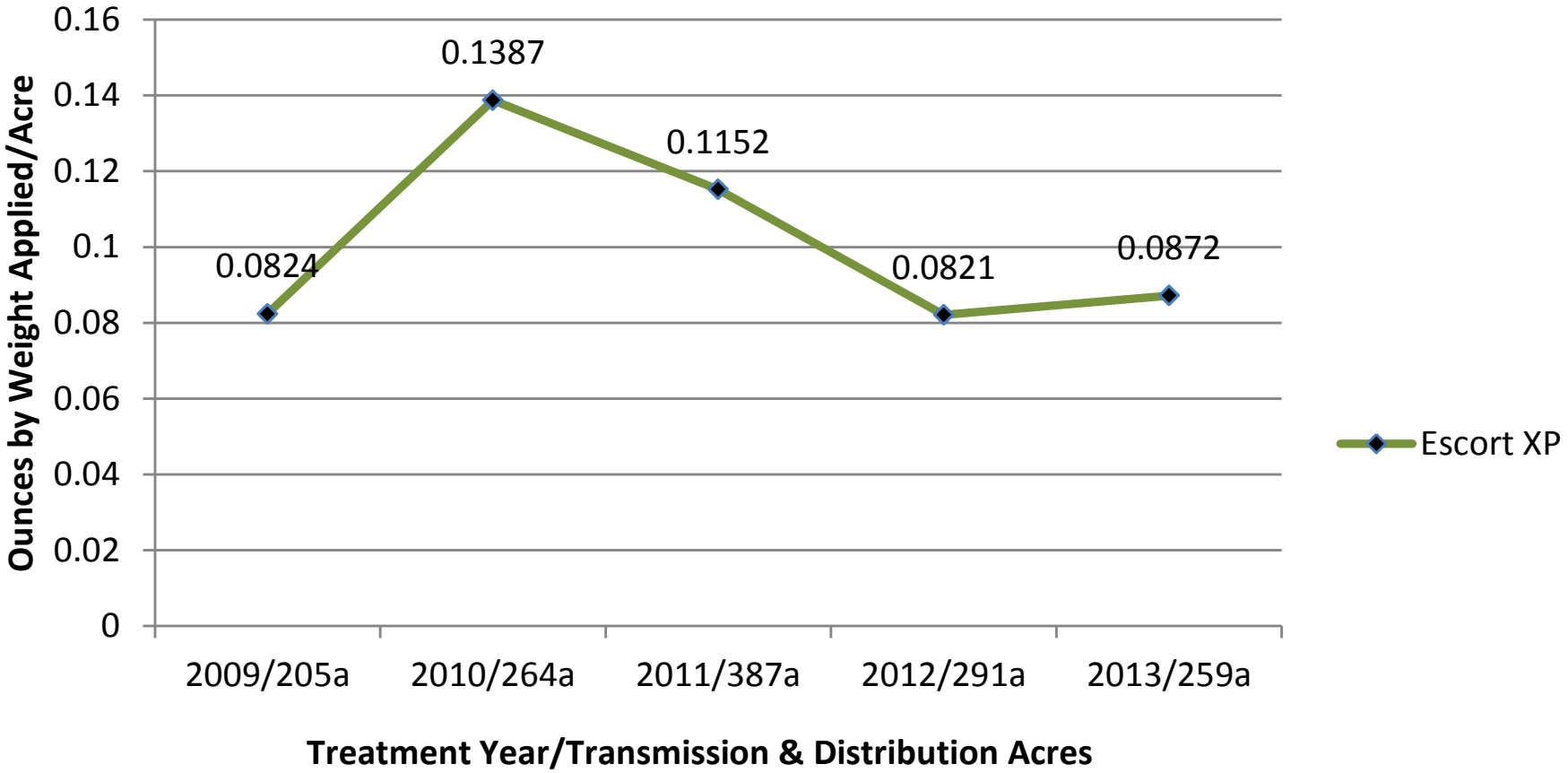


Treatment Year/Transmission Acres/Distribution Acres

Note: Glyphosate & Imazapyr are measured by liquid volume
See seperate chart for Escort XP use rate

VEC ROW Herbicide Use History

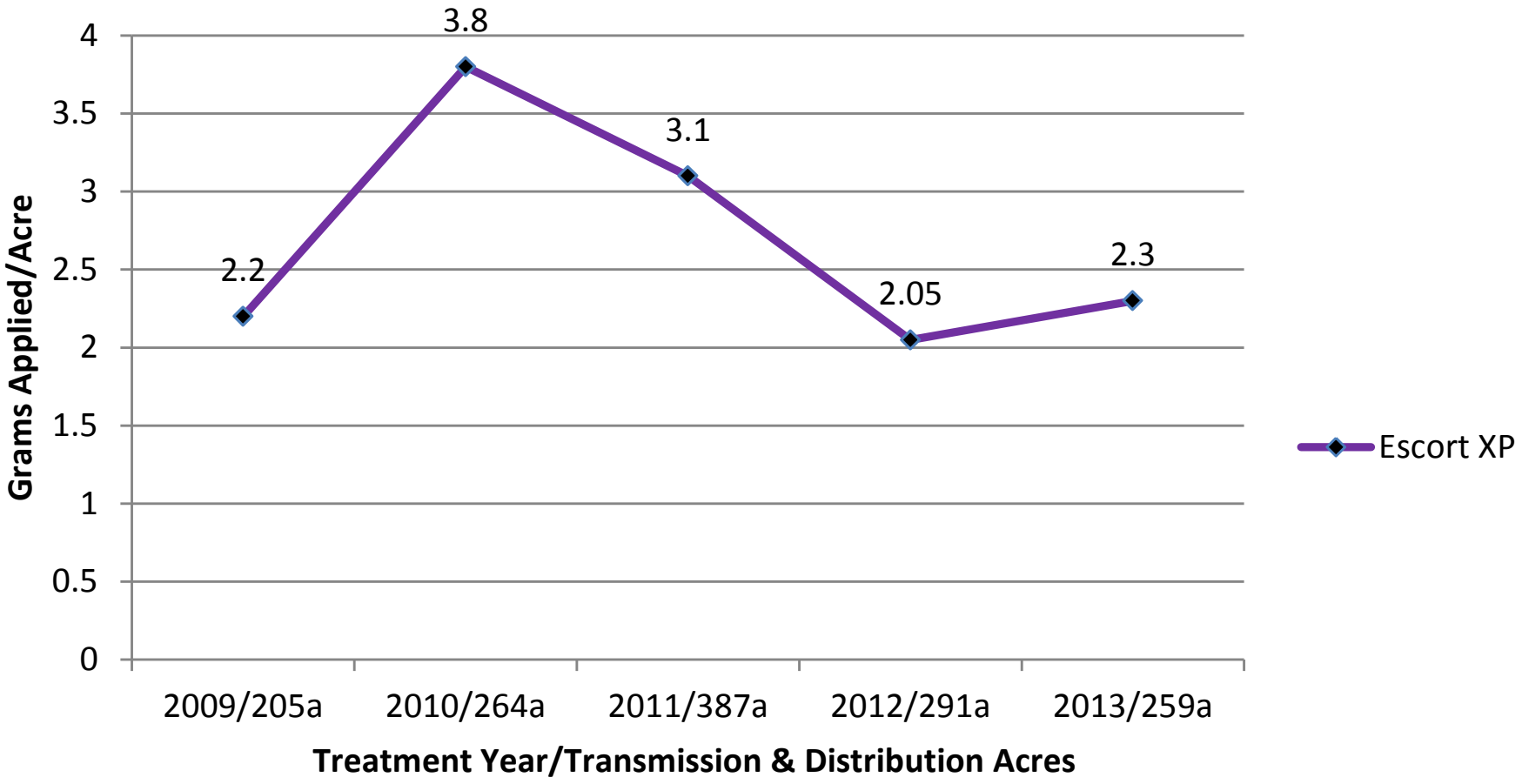
Escort XP in Ounces from VCS use reports



Note: Escort XP is measured by weight & mixed at a rate of 2-4 oz/100 gallons water.
See seperate chart for Glyphosate/Imazapyr use rate.

VEC ROW Herbicide Use History

Escort XP in grams from VCS use reports



Note: Escort XP is measured by weight . See seperate chart for Glyphosate/Imazapyr use rate.