

**\*Container Label\***

GROUP	<b>14</b>	HERBICIDE
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**VIKING™ Sulfentrazone Herbicide**

SUSPENSION

COMMERCIAL (AGRICULTURAL)

For Use on Chickpeas, Field Pea, Flax, Sunflower, and Soybeans

**REGISTRATION NUMBER:** 35327 PEST CONTROL PRODUCTS ACT

**ACTIVE INGREDIENT:** Sulfentrazone..... 480 g/L

Contains 2-phenylphenol at 0.032% as a preservative.

**NET CONTENTS:** 1.95 L – 1020 L

**READ THE LABEL AND ATTACHED BOOKLET BEFORE USING**

**In case of emergency call the 24 hour Emergency Response Number 1-800-424-9300 or  
1-703-527-3887**

**Viking Crop Production Partners Inc.**

Box 18033

RPO Shawnessy

Calgary, AB. T2Y 0K3

1-587-743-1029

## **NOTICE TO USER**

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

## **FIRST AID**

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

**If on skin or clothing:** Take off contaminated clothing. Rinse skin immediately with plenty of water for 15-20 minutes. Call a poison control centre or doctor for treatment advice.

**If in eyes:** Hold eye open and rinse slowly and gently with water for 15-20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. Call a poison control centre or doctor for treatment advice.

**If swallowed:** Call a poison control centre or doctor immediately for treatment advice. Have person sip a glass of water if able to swallow. Do not induce vomiting unless told to do so by a poison control centre or doctor. Do not give anything by mouth to an unconscious person.

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

## **TOXICOLOGICAL INFORMATION**

Treat symptomatically.

## **PRECAUTIONS**

### **KEEP OUT OF REACH OF CHILDREN**

Avoid breathing vapor or spray mist. Avoid contact with skin, eyes or clothing.

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

### **PERSONAL PROTECTIVE EQUIPMENT (PPE)**

Wear a long-sleeved shirt, long pants, chemical-resistant gloves, socks and shoes during mixing, loading, application, clean-up and repair. Gloves are not required during application within a closed cab. Discard clothing and other absorbent materials that have been drenched or heavily contaminated with this product. Do not reuse them. Follow manufacturer's instructions for cleaning and maintaining PPE. If no such instructions for washables, use detergent and hot water. Keep and wash PPE separately from other laundry.

Remove clothing immediately if pesticide gets inside. Then bathe thoroughly and put on clean clothing.

### **RESTRICTED-ENTRY INTERVAL**

DO NOT enter or allow worker entry into treated areas during the restricted-entry interval (REI) of 12 hours.

### **IMPORTANT**

- DO NOT apply this product in a way that will contact workers or other persons, either directly or through drift. For any requirements specific to your area, consult the provincial agency responsible for pesticide regulation.

- DO NOT apply more than the allowed amount per hectare per 24-month period. The 24 month period is considered to begin upon the initial application.

## **ENVIRONMENTAL PRECAUTIONS**

**Toxic to small wild mammals.**

**Toxic to aquatic organisms and non-target terrestrial plants. Observe spray buffer zones specified under DIRECTIONS FOR USE.**

Sulfentrazone is persistent and may carryover. It is recommended that this product not be used in areas treated with any products containing sulfentrazone during the previous 24 months.

This product demonstrates the properties and characteristics associated with chemicals detected in groundwater. The use of this product in areas where soils are permeable, particularly where the water table is shallow, may result in groundwater contamination. **DO NOT** use on coarse soils.

To reduce runoff from treated areas into aquatic habitats, avoid application to areas with a moderate to steep slope, compacted soil, or clay.

Avoid application when heavy rain is forecast.

Contamination of aquatic areas as a result of runoff may be reduced by including a vegetative filter strip between the treated area and the edge of the water body.

## **STORAGE**

Store this product away from food or feed.

STORE ABOVE 5°C TO KEEP PRODUCT FROM FREEZING. If frozen, thaw before use. If solid crystals are observed, warm material to above 15 °C by placing container in warm location. Shake or roll container periodically to re-dissolve solids.

Do not use or store near heat or open flame.

Store in original containers only. Store containers in a dry location. Carefully open containers. After partial use, replace lids and close tightly. Do not put concentrate or dilute material into food or drink containers. Do not contaminate other pesticides, fertilizers, water, food, or feed by storage or disposal.

## **DISPOSAL**

### **For refillable containers:**

For disposal, this container may be returned to the point of purchase (distributor/dealer). It must be refilled by the distributor/dealer with the same product. DO NOT reuse this container for any other purpose.

### **For returnable containers:**

DO NOT reuse this container for any purpose. For disposal, the empty container may be returned to the point of purchase (distributor/dealer).

### **For recyclable containers:**

DO NOT reuse this container for any purpose. This is a recyclable container and is to be disposed of at a container collection site. Contact your local distributor/dealer or municipality for the location of the nearest collection site. Before taking the container to the collection site:

1. Triple- or pressure-rinse the empty container. Add the rinsings to the spray mixture in the tank.

2. Make the empty, rinsed container unsuitable for further use.

If there is no container collection site in your area, dispose of the container in accordance with provincial/territorial requirements.

For information on disposal of unused, unwanted product, contact the manufacturer or the provincial/territorial regulatory agency. Contact the manufacturer and the provincial/territorial regulatory agency in case of a spill, and for clean-up of spills.

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Viking (TM) is a trademark of Viking Crop Production Partners Inc.

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## **GENERAL INFORMATION**

### **SECTION 1: NOTICE TO USER**

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

### **SECTION 2: PRODUCT INFORMATION**

**VIKING Sulfentrazone Herbicide** is a selective soil applied herbicide for the control of a variety of weeds in labelled crops.

**VIKING Sulfentrazone Herbicide** is formulated as a flowable (suspension concentrate) containing 480 grams of the active ingredient, sulfentrazone, per litre, intended for dilution with water for application.

**VIKING Sulfentrazone Herbicide** is taken up by the plant roots and shoots.

Observe all instructions, mixing directions, application precautions and other label information of **VIKING Sulfentrazone Herbicide**.

For information regarding the use of this product, visit [www.vikingcropproduction.com](http://www.vikingcropproduction.com).

## **SAFETY AND HANDLING**

### **SECTION 3: PROPER HANDLING INSTRUCTIONS**

**VIKING Sulfentrazone Herbicide** may not be mixed or loaded within 15 metres of any wells (including abandoned wells and drainage wells), sink holes, perennial or intermittent streams or rivers, and natural or impounded lakes and reservoirs. This setback does not apply to properly capped or plugged abandoned wells and does not apply to impervious pads or properly diked mixing/loading areas.

Operations that involve mixing, loading, rinsing or washing of this product into or from pesticide handling or application equipment or containers within 15 metres of any well, are prohibited unless conducted on an impervious pad constructed to withstand the weight of the heaviest load that may be positioned on or moved across the pad. Such a pad shall be designed and maintained to contain any product spills or equipment leaks, container or equipment rinse or wash water, and rainwater that may fall on the pad. Surface water shall not be allowed to either flow over or from the pad, which means the pad must be self-contained. The pad shall be sloped to facilitate material removal. An unroofed pad shall be of sufficient capacity to contain at a minimum 110% of the capacity of the largest pesticide container or application equipment on the pad. A pad that is covered by a roof of sufficient size to completely exclude precipitation from contact with the pad shall have a minimum containment capacity of 100% of the capacity of the largest pesticide container or application equipment on the pad. Containment capacities as described above shall be maintained at all times. The above specific minimum containment capacities do not apply to vehicles when delivering pesticide shipments to the mixing/loading site. Provinces may have in effect additional requirements regarding wellhead setbacks and operational containment.

**VIKING SULFENTRAZONE HERBICIDE** must be used in a manner which will prevent back siphoning in wells, spills or improper disposal of excess pesticide, spray mixtures or rinsates.

### **SECTION 4: FIRST AID AND TOXICOLOGICAL INFORMATION**

#### **FIRST AID**

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

**If on skin or clothing:** Take off contaminated clothing. Rinse skin immediately with plenty of water for 15-20 minutes. Call a poison control centre or doctor for treatment advice.

**If in eyes:** Hold eye open and rinse slowly and gently with water for 15-20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. Call a poison control centre or doctor for treatment advice.

**If swallowed:** Call a poison control centre or doctor immediately for treatment advice. Have person sip a glass of water if able to swallow. Do not induce vomiting unless told to do so by a poison control centre or doctor. Do not give anything by mouth to an unconscious person.

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

## **TOXICOLOGICAL INFORMATION**

Treat Symptomatically.

## **SECTION 5: PRECAUTIONS, PROTECTIVE CLOTHING AND EQUIPMENT**

### **PRECAUTIONS**

#### **KEEP OUT OF REACH OF CHILDREN**

Avoid breathing vapor or spray mist. Avoid contact with skin, eyes or clothing.

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

#### **PERSONAL PROTECTIVE EQUIPMENT (PPE)**

Wear a long-sleeved shirt, long pants, chemical-resistant gloves, socks and shoes during mixing, loading, application, clean-up and repair. Gloves are not required during application within a closed cab.

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#### **RESTRICTED-ENTRY INTERVAL**

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#### **IMPORTANT**

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- **DO NOT** apply more than the allowed amount per hectare per 24-month period. The 24-month period is considered to begin upon the initial application.

## **SECTION 6: ENVIRONMENTAL PRECAUTIONS**

Toxic to small wild mammals.

Toxic to aquatic organisms and non-target terrestrial plants. Observe spray buffer zones specified under DIRECTIONS FOR USE.

Sulfentrazone is persistent and may carryover. It is recommended that this product not be used in areas treated with any products containing sulfentrazone during the previous 24 months.

This product demonstrates the properties and characteristics associated with chemicals detected in groundwater. The use of this product in areas where soils are permeable, particularly where the water table is shallow, may result in groundwater contamination. **DO NOT** use on coarse soils.

To reduce runoff from treated areas into aquatic habitats, avoid application to areas with a moderate to steep slope, compacted soil, or clay.

Avoid application when heavy rain is forecast.

Contamination of aquatic areas as a result of runoff may be reduced by including a vegetative filter strip between the treated area and the edge of the water body.

## **SECTION 7: STORAGE**

Store this product away from food or feed.

STORE ABOVE 5°C TO KEEP PRODUCT FROM FREEZING. If frozen, thaw before use. If solid crystals are observed, warm material to above 15 °C by placing container in warm location. Shake or roll container periodically to re-dissolve solids.

Do not use or store near heat or open flame.

Store in original containers only. Store containers in a dry location. Carefully open containers. After partial use, replace lids and close tightly. Do not put concentrate or dilute material into food or drink containers. Do not contaminate other pesticides, fertilizers, water, food, or feed by storage or disposal.

## **SECTION 8: DISPOSAL**

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If there is no container collection site in your area, dispose of the container in accordance with provincial/territorial requirements.

For information on disposal of unused, unwanted product, contact the manufacturer or the provincial/territorial regulatory agency. Contact the manufacturer and the provincial/territorial regulatory agency in case of a spill, and for clean-up of spills.

**DIRECTIONS FOR USE**

**SECTION 9: CROPS AND WEEDS**

**SECTION 9.1: CROPS**

**VIKING Sulfentrazone Herbicide** may be used during production of the following crops: chickpeas, field peas, flax, sunflower, and soybeans. Refer to SECTION 9.3: SPECIFIC CROP INFORMATION for guidance regarding application timing, rates and precautions.

**VIKING Sulfentrazone Herbicide** does not control emerged weeds.

**SECTION 9.2: WEEDS CONTROLLED**

When used as directed, **VIKING Sulfentrazone Herbicide** will provide control of the weeds listed in the table below.

Use rate (mL/ha)	Weeds controlled
219	Kochia
292	Above weeds plus: Redroot pigweed Lamb's-quarters Wild buckwheat Eastern black nightshade Common waterhemp Smooth crabgrass Large crabgrass Yellow woodsorrel Common groundsel Powell pigweed (green pigweed) Common purslane

**Soil Parameters**

**VIKING Sulfentrazone Herbicide** must only be applied to soils that fall within the parameters outlined in the table below.

Soil Texture	Soil Type	Organic Matter	pH
Fine	Silty clay loam, silty clay, clay loam, clay	1.5 - 6%	<7.8
Medium	Sandy clay loam, sandy clay, loam, silt loam, silt		
Coarse	Sand, loamy sand, sandy loam	DO NOT USE	

Do not apply to soil classified as coarse-textured.

Do not apply to soil with an organic matter content less than 1.5% or greater than 6%. Do not apply to soil with a pH of 7.8 or greater.

## Timing of Application

### Spring Application

**VIKING Sulfentrazone Herbicide** can be applied in the spring pre-plant or pre-emergence up the three-days after seeding.

Do not mechanically incorporate as this can destroy the herbicide barrier and allow weeds to escape.

Refer to “SECTION 9.3: SPECIFIC CROP INFORMATION” for full application instructions for each crop.

## **SECTION 9.3: SPECIFIC CROP INFORMATION**

### **SECTION 9.3.1 FIELD CROPS**

#### **CHICKPEAS, FIELD PEAS, FLAX, SUNFLOWER, SOYBEANS**

Make one pre plant or pre-emergence application every other year in the spring. Apply in 100 L of water per ha.

#### **Restrictions**

DO NOT mechanically incorporate.

DO NOT apply to frozen soils or existing snow cover.

**VIKING Sulfentrazone Herbicide** can be applied once in a 24-month period. DO NOT apply any additional products containing sulfentrazone during this 24-month period. The 24-month period is considered to begin when the initial application of **VIKING Sulfentrazone Herbicide** is applied.

#### **WEED CONTROL INFORMATION**

**VIKING Sulfentrazone Herbicide** is a selective soil-applied herbicide for the control of susceptible broadleaf and grass weeds. Adequate moisture of at least 13 mm is required within 14 days after application for optimal control. If adequate rainfall is not received in a timely fashion, irrigate with a minimum of 13 mm of water. When activating moisture is delayed, a reduced level of weed control may occur. These escaped weeds can be removed using a burndown herbicide.

Tank mix **VIKING Sulfentrazone Herbicide** with a burndown herbicide and use an appropriate adjuvant when weeds are present at the time of application. Refer to the tank mix partner’s product label for the proper use rates by weed sizes.

Residual weed control may be reduced when **VIKING Sulfentrazone Herbicide** is applied where heavy crop trash such as leaves and branches and /or weed residues exists. It is best to rake or blow off the leaves and trash when they fall and prior to the **VIKING Sulfentrazone Herbicide** application.

Do not apply after petal fall unless using a hooded or shielded sprayer to ensure that the spray solution will not come in contact with the crop or foliage.

**VIKING Sulfentrazone Herbicide** can be applied once per 24-month period. DO NOT apply any additional products containing sulfentrazone in this 24-month period. The 24-month period is considered to begin when the initial application of **VIKING Sulfentrazone Herbicide** is applied.

These Crop Specific Use directions are based upon the interactive effects of **VIKING Sulfentrazone Herbicide** (sulfentrazone) and the primary soil and environmental factors, which affect its activity on various weed species and tolerance among crops. The user is required to observe the instructions and guidance presented under General Application Instructions, General **VIKING Sulfentrazone Herbicide** Product Use Rates, Rotational Crop Guidelines, Replanting Instructions, Weeds Controlled and any other section of this label pertinent to the anticipated crop use. It is important to note that not all varieties or cultivars of a given crop species have been

evaluated under treatment with **VIKING Sulfentrazone Herbicide**. Consult university or extension weed management specialists for additional information on specific local varieties or cultivars and any other pertinent information on **VIKING Sulfentrazone Herbicide** under specific local conditions.

#### **SECTION 9.4: TANK MIXES**

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

In some cases, tank mixing pest control products can result in reduced pesticide efficacy or increased host crop injury. The user should contact Viking Crop Production Partners Inc. at 1-587-743-1029 for information before applying any tank mix that is not specifically recommended on this label.

#### **VIKING SULFENTRAZONE HERBICIDE PLUS EXPRESS® SG HERBICIDE AND GLYPHOSATE FOR FIELD PEA AND SOYBEAN**

For control of broadleaf weeds and grasses pre-seed to field pea, and soybean.

Fields treated with this tank mix in the spring can be seeded to field pea and soybean a minimum of 24 hours after application.

Apply **VIKING Sulfentrazone Herbicide** at 219 mL/ha or 292 mL/ha for field pea and soybean plus EXPRESS® SG Herbicide at 15 g/ha, tank mixed with glyphosate (present as potassium salt, isopropylamine salt, ammonium salt) at 450 to 810 g ae/ha in a total spray volume of 100 L/ha.

This tank mix will control weeds listed on this label, corresponding to the rate of **VIKING Sulfentrazone Herbicide** applied, as well as those listed in the following table.

Tank Mix Partner	Application Rate	Application Stage	Weeds Controlled	Weeds Suppressed*
Express® SG Herbicide + Glyphosate (present as potassium salt, isopropylamine salt, ammonium salt)	15 g/ha + 450 g ae/ha	Up to 8 cm	Canada fleabane, common ragweed, narrow leaved hawk's beard	Scentless chamomile
		Up to 10 cm		Wild carrot
		Up to 15 cm	Dandelion, downy brome, flixweed, giant foxtail, green foxtail, hemp nettle, kochia, lady's thumb, lamb'squarters, Persian dandelion, redroot pigweed, stinkweed, volunteer barley, volunteer canola (including glyphosate-tolerant varieties), volunteer flax, volunteer wheat, wild mustard, wild oats	Tufted vetch
		Up to 3-leaf	Cow cockle, wild buckwheat	
		Up to 8-leaf	Common chickweed	
		Rosette		Canada thistle, White cockle
		Express® SG Herbicide + Glyphosate (present as potassium salt, isopropylamine salt, ammonium salt)	15 g/ha + 810 g ae/ha	Weeds up to 15 cm in height

\*Weed suppression is a visual reduction in weed competition (reduced population or vigour) as compared to an untreated area. Degree of suppression will vary with size of weed and environmental conditions prior to and following treatment.

**For pre-seed applications in the spring, injury to pulse crops may occur on in fields with variable soils, gravelly areas, sandy areas or eroded knolls.**

Do not apply to soils with an organic matter content less than 3% or greater than 6% Do not apply to soils classified as coarse-textured.

Do not use on soils with a pH of 7.8 or greater.

Do not mechanically incorporate in the fall or spring.

Do not apply to frozen soils or existing snow cover.

This tank mix can be applied once per 24-month period. DO NOT apply any additional products containing sulfentrazone in this 24-month period. The 24-month period is considered to begin when the initial application of **VIKING Sulfentrazone Herbicide** is applied.

## **SECTION 10: APPLICATION INFORMATION**

### **SECTION 10.1: GENERAL APPLICATION INSTRUCTIONS**

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

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

Field sprayer application: DO NOT apply during periods of dead calm. Avoid application of this product when winds are gusty. DO NOT apply with spray droplets smaller than the American Society of Agricultural Engineers (ASAE S572.1) medium classification. Boom height must be 60 cm or less above the crop or ground.

**DO NOT** apply by air.

**VIKING Sulfentrazone Herbicide** can be applied with conventional ground spraying equipment.

For certain crops, **VIKING Sulfentrazone Herbicide** may be applied pre-plant or pre-emergence **AS A SINGLE GROUND APPLICATION**. **VIKING Sulfentrazone Herbicide** can be applied prior to planting or, for crops where pre-emergence application is permitted, up to 3 days after planting, but before seed germination. When applications after planting are delayed greater than 3 days, injury may occur if seeds are germinating. **VIKING Sulfentrazone Herbicide** applied near or after crop emergence may cause severe injury to the crop. Do not make fall applications to a crop unless it is specifically recommended on this label.

Water must be used as the carrier for **VIKING Sulfentrazone Herbicide**. Do not allow spray mixtures to sit overnight due to potential settling of product and difficulty in resuspending may occur. Avoid spray drift to adjacent plants as injury to other plants may occur.

#### **Ground Application**

Utilize a boom and nozzle sprayer or boomless ground sprayer equipped with the appropriate nozzles, spray tips and screens and adjusted to provide optimum spray distribution and coverage at the appropriate operating pressures. Utilize nozzles and pressures that produce a medium spray as classified by the American Society of Agricultural Engineers (ASAE S572.1) to avoid spray drift or inadequate foliar and soil coverage. Consult with spray nozzle manufacturer's charts to determine the correct nozzle and pressure combination required to achieve a medium spray. Utilize nozzles that produce minimal amounts of fine spray droplets to avoid spray drift or inadequate foliar and soil coverage. Do not exceed 175 kPa spray pressure unless otherwise required by the manufacturer of drift reducing nozzles or boomless application systems. Apply a minimum of 100 litres of finished spray per hectare by ground. Be aware that spray pattern overlaps and slower ground speeds while starting, stopping or turning while spraying may result in excessive application and subsequent crop response.

#### **Pre-emergence Application**

For certain crops, **VIKING Sulfentrazone Herbicide** alone, or in certain tank mixes, may be applied to the soil surface as a broadcast spray after planting of the crop but prior to weed emergence or crop germination.

Pre-emergence application may be made in all tillage systems (conventional, conservation, minimum tillage, etc.).

Rainfall and/or overhead sprinkler irrigation is necessary to move **VIKING Sulfentrazone Herbicide** into the upper soil layer where weed seeds germinate.

Dry weather conditions as well as excessive rainfall or irrigation following application may reduce weed control.

Do not apply heavy irrigation immediately after application.

### Band Application

If a band application is desired, the herbicide may be applied as described below by using proportionally less **VIKING Sulfentrazone Herbicide** per hectare. Weeds between treated bands should be removed by cultivating, as needed, using protective fenders to keep freshly turned soil off treated bands.

When applied as a banded treatment (50% band or less), refer to formula in chart below for rate and volume. **VIKING Sulfentrazone Herbicide** may be applied once every other year.

For band treatments, apply the broadcast equivalent rate and volume per ha. To determine these:

$$\frac{\text{Band width}}{\text{in centimetres Row width}} \times \text{Broadcast rate per hectare} = \text{Band rate per hectare}$$

In centimetres

$$\frac{\text{Band width in centimetres}}{\text{Row width}} \times \text{Broadcast volume per hectare} = \text{Band volume per hectare}$$

In centimetres

### Spray Drift Management

Minimizing spray drift at the application site is the responsibility of the applicator and the grower. 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.

### Controlling Spray Droplet Size

**Volume:** Use high flow rate nozzles to apply the greatest practical spray volume. Nozzles with higher rated flow generally produce larger droplets.

**Pressure:** When higher flow rates are needed, use higher flow rate nozzles rather than increasing spray pressure. Do not exceed the nozzle manufacturer's recommended pressures. Lower pressure produces larger droplets in many types of nozzles.

**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 for ground applications.

Consult with spray nozzle manufacturer's charts to determine the correct nozzle and pressure combination required to achieve a medium spray.

Use 50 mesh filter screens or larger (metal or nylon).

### Moisture Requirement

All soil applications of **VIKING Sulfentrazone Herbicide** require adequate moisture (at least 13 mm) for herbicidal activation. The ultimate amount of moisture, whether supplied by rainfall or irrigation, is dependent on several factors. These factors include but are not limited to existing soil moisture at application, soil type, organic matter and pH. In crop situations, dependent on rainfall, **VIKING Sulfentrazone Herbicide** can await activating moisture for extended periods (10 to 14 days or longer) depending on the soil parameters described above. Once activated, **VIKING Sulfentrazone Herbicide** will provide activity on existing weeds. In circumstances where prolonged periods without rainfall or irrigation are not possible, alternative or additional weed management practices (e.g., post-applied herbicides) may be required.

When activating moisture is received after dry conditions, **VIKING Sulfentrazone Herbicide** may provide a reduced level of control of susceptible germinating weeds. Soil applications of **VIKING Sulfentrazone Herbicide** must be made before crop seed germination to prevent injury to the emerging crop seedlings. When applications after planting are delayed, injury may occur if seeds are germinating or if they are located near the soil surface.

### Mode of Action

Sulfentrazone, the active ingredient in **VIKING Sulfentrazone Herbicide**, is a potent inhibitor of the enzyme Protoporphyrinogen Oxidase IX (Protox) required for the formation of chlorophyll. Inhibition of the PPO IX enzyme results in the liberation of singlet oxygen (O) that, in turn, disrupts cellular membranes and causes cellular leakage. The ultimate manifestation of the process is cellular death leading to plant death. The selective herbicidal activity of sulfentrazone is based on its greater affinity for the PPO IX enzyme in weed species versus crop plants.

### Mechanism of Action

Following the application of **VIKING Sulfentrazone Herbicide** to soil, germinating seeds and seedlings take up sulfentrazone from the soil solution. The amount of sulfentrazone in soil solution, and available for weed uptake, is determined primarily by soil type, organic matter and soil pH. Sulfentrazone adsorbs to the clay and organic matter fractions of soils effectively limiting the amount of active ingredient immediately available to control weeds. Soils typically increase in clay content through the series from coarse to fine as noted in the following Soil Classification Chart.

### Soil Classification Chart

Coarse*	Medium	Fine
Sand, loamy sand, sandy loam	Sandy clay loam, sandy clay, loam, silt loam, silt	Silty clay loam, silty clay, clay loam, clay

\*DO NOT apply to coarse soils.

### Influence of Soil Type, Organic Matter and pH on VIKING Sulfentrazone Herbicide Use Rates and Crop Response

Soil organic matter content can vary widely and independently of soil type and requires an accurate analysis of representative soil samples to determine its content. Soil pH also exerts a dramatic effect on sulfentrazone

availability in the soil solution. As soil pH increases, sulfentrazone availability increases. Determining soil pH requires an accurate analysis of representative soil samples. **\*DO NOT** apply to coarse soils.

The total amount of sulfentrazone available in solution, in any given soil, is determined by the interaction of soil type (primarily clay content), % organic matter and pH. The application timing (relative to the emergence of the crop and weeds) and amount of rainfall and/or irrigation received will ultimately determine, in conjunction with the soil parameters and pH, the amount of sulfentrazone in soil solution. It is important to note that **VIKING Sulfentrazone Herbicide** can await activating moisture. However, diminished weed control may result due to the successive increase in weed growth versus timing of activation.

It is important to note that irrigation with highly alkaline water (high pH) following a **VIKING Sulfentrazone Herbicide** soil application can also significantly increase the amount of sulfentrazone available in the soil solution. Irrigation with water having a pH greater than 7.5 could result in adverse crop response. This response will ultimately depend on initial **VIKING Sulfentrazone Herbicide** application rate, timing, amount and pH of irrigation water and sensitivity of the crop and its growth stage when irrigated. The risk of adverse crop response will lessen with the advances in growth stages among most crops.

**Sulfentrazone is persistent and will last in the soils (carryover) for one to two years. DO NOT APPLY VIKING Sulfentrazone Herbicide TO FIELDS PREVIOUSLY TREATED WITH ANY SULFENTRAZONE-CONTAINING PRODUCT IN CONSECUTIVE YEARS (24 MONTHS). In case of drought in any of those years, a subsequent application of VIKING Sulfentrazone Herbicide should be further delayed by the equivalent number of years in which drought occurred. VIKING Sulfentrazone Herbicide requires at least 13 mm of rain or irrigation water to be effective.**

**SECTION 10.2: SPRAY BUFFER ZONES**

The spray buffer zones specified in the table below are required between the point of direct application and the closest downwind edge of sensitive terrestrial habitats (such as grasslands, forested areas, shelter belts, woodlots, hedgerows, riparian areas and shrublands) and sensitive freshwater habitats (such as lakes, rivers, sloughs, ponds, prairie potholes, creeks, marshes, streams, reservoirs and wetlands).

Method of application	Crop	Spray Buffer Zones (metres) Required for the Protection of:		
		Freshwater Habitat of Depths:		Terrestrial Habitat
		Less than 1 m	Greater than 1 m	
Field sprayer	Chickpea, Field Pea, Flax, Sunflower, and Soybean	1	0	10

When tank mixes are permitted, consult the labels of the tank-mix partners and observe the largest (most restrictive) spray buffer zone of the products involved in the tank mixture and apply using the coarsest spray (ASAE) category indicated on the labels for those tank mix partners.  
 The spray buffer zones for this product can be modified based on weather conditions and spray equipment configuration by accessing the Spray Buffer Zone Calculator on the Pesticides portion of the Canada.ca website.

**SECTION 10.3: ROTATIONAL CROP GUIDELINES**

The following table shows the minimum interval in months from the time of the last **VIKING Sulfentrazone Herbicide** application until **VIKING Sulfentrazone Herbicide** treated soil can be replanted to the crops listed as follows.

**Rotational crops and replant intervals for VIKING Sulfentrazone Herbicide.**

Rotational Crop	Replant Interval (Months)
Chickpea, field pea, flax, soybean, sunflowers	0
Alfalfa, barley, field corn, spring and durum wheat	12
Winter wheat	16
Sweet and popcorn, sorghum, canola	24
Lentils	36

For crops listed in the rotational crop table, the minimum replant interval listed in the table must be observed. For crops not listed in the rotational crop table, A MINIMUM ROTATIONAL CROP INTERVAL OF 36 MONTHS must be observed, and a representative bioassay of the field must be conducted with the rotational crop and adequate soil moisture to evaluate potential crop sensitivity.

If there is a lack of adequate or normal soil moisture due to drought conditions following an application of VIKING Sulfentrazone Herbicide, the minimum rotational crop interval listed in the table must be extended for one additional year and a representative bioassay of the field must be conducted with the potential rotational crop and adequate soil moisture to determine the crop sensitivity to VIKING Sulfentrazone Herbicide.

**REPLANTING INSTRUCTIONS**

If initial planting of labeled crops fails to produce a stand, only labeled crops for **VIKING Sulfentrazone Herbicide** may be planted. **DO NOT** re-treat field with **VIKING Sulfentrazone Herbicide**. Do not plant treated fields with any crop at intervals that are inconsistent with the Rotational Crop Guidelines on this label. When replanting use minimum soil tillage to preserve the herbicide barrier and achieve maximum weed control.

**SECTION 11: MIXING AND LOADING INSTRUCTIONS**

**Spray Tank Preparation**

It is important that spray equipment is clean and free of existing pesticide deposits before using this product. Follow the spray tank clean out procedures specified on the label of product previously applied before adding **VIKING Sulfentrazone Herbicide** to the tank.

### **Mixing and Loading Instructions**

**VIKING Sulfentrazone Herbicide** is a suspension concentrate intended for dilution with water. For best results, fill spray tank with one half of the volume of clean water needed for the area to be treated. Start the agitation system. Slowly add the **VIKING Sulfentrazone Herbicide** to the spray tank. Complete filling the spray tank to the desired level. Continuous spray tank agitation is required at all times to maintain a uniform spray solution. Make sure **VIKING Sulfentrazone Herbicide** is thoroughly mixed before application.

Use the **VIKING Sulfentrazone Herbicide** mixture immediately after mixing.

Do not store the sprayer overnight or for any extended period of time with the sulfentrazone spray mixture remaining in the tank.

Premixing **VIKING Sulfentrazone Herbicide** spray solutions in nurse tanks is not recommended.

**Tank Mixtures:** Fill spray tank one-half to two-thirds full of water. With agitator operating, add the recommended amount of ingredients using the following order:

- **Wettable powders and dispersible granules**
- **Agitate tank mix thoroughly.**
- **Micro-encapsulated suspensions**
- **Liquid flowables and suspensions**
- **Emulsifiable concentrate formulations**
- **Fill spray tank nearly full of water.**
- **Glyphosate formulations**
- **Surfactants**
- **Complete filling the spray tank to the desired level**

### **SECTION 12: SPRAYER EQUIPMENT CLEANOUT**

After spraying **VIKING Sulfentrazone Herbicide** and before using sprayer equipment for any other applications, the sprayer must be thoroughly cleaned using the following procedure:

1. Drain sprayer tank, hoses, and spray boom. Use a high-pressure detergent wash to remove physical sediment and residues from the inside of the sprayer tank and thoroughly rinse. Then thoroughly flush all sprayer hoses, booms, and nozzles with clean water.
2. Prepare a sprayer cleaning solution by adding three litres of ammonia (containing at least 3% active) per 100 litres of clean water. Prepare sufficient cleaning solution to allow the operation of the spray system for a minimum of 15 minutes to thoroughly flush hoses, spray boom and spray nozzles.
3. Convenient and thorough cleaning of the sprayer can be achieved if the ammonia solution or fresh water is left in the spray tank, hoses, spray booms and spray nozzles overnight or during storage.
4. Drain the sprayer system. Rinse the tank with clean water and flush through the hoses, boom, and nozzles. Remove and clean spray tips and all strainers and screens separately in an ammonia solution.
5. Properly dispose of all cleaning solution and rinsate in accordance with provincial guidelines and regulations.

Do not drain or flush equipment on or near desirable trees or plants.

Do not contaminate any body of water including irrigation water that may be used on other plants or crops.

## **SECTION 13: RESISTANCE MANAGEMENT RECOMMENDATIONS**

For resistance management, **VIKING Sulfentrazone Herbicide** is a Group 14 herbicide. Any weed population may contain or develop plants naturally resistant to **VIKING Sulfentrazone Herbicide** and other Group 14 herbicides. The resistant biotypes may dominate the weed population if these herbicides are used repeatedly in the same field. Other resistance mechanisms that are not linked to site of action, but specific for individual chemicals, such as enhanced metabolism, may also exist. Appropriate resistance-management strategies should be followed.

To delay herbicide resistance:

- Where possible, rotate the use of **VIKING Sulfentrazone Herbicide** or other Group 14 herbicides within a growing season (sequence) or among growing seasons with different groups that control the same weeds in a field.
- Use tank mixtures with herbicides from a different group when such use is permitted. To delay resistance, the less resistance-prone partner should control the target weed(s) as effectively as the more resistance-prone partner.
- Herbicide use should be based on an integrated weed management program that includes scouting, historical information related to herbicide use and crop rotation, and considers tillage (or other mechanical control methods), cultural (for example, higher crop seeding rates; precision fertilizer application method and timing to favour the crop and not the weeds), biological (weed-competitive crops or varieties) and other management practices.
- Monitor weed populations after herbicide application for signs of resistance development (for example, only one weed species on the herbicide label not controlled). If resistance is suspected, prevent weed seed production in the affected area, if possible, by an alternative herbicide from a different group. Prevent movement of resistant weed seeds to other fields by cleaning harvesting and tillage equipment when moving between fields and planting clean seed.
- Have suspected resistant weed seeds tested by a qualified laboratory to confirm resistance and identify alternative herbicide options.
- Contact your local extension specialist or certified crop advisors for any additional pesticide resistance-management and/or integrated weed-management recommendations for specific crops and weed biotypes.
- For further information or to report suspected resistance, contact Viking Crop Production Partners Inc. at 1-587-743-1029 or [vikingcropproduction.com](http://vikingcropproduction.com).

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