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1.0 | INTRODUCTION TO HERBICIDES

Major reasons for highway right-of-way (ROW) vegetation management practices include:

- To maintain the integrity of the paved surface
- To prevent or reduce erosion
- To provide for the safety of the traveling public
- To provide for efficient maintenance practices
- To maintain drainage
- To provide beauty
- To provide wildlife habitat

Vegetation management along the transportation system consists of the propagation and control of vegetation. Control of vegetative growth is accomplished by a combination of physical and chemical methods. Physical methods of vegetation control include hand-pulling, hoeing, plowing, cultivating, trimming and mowing. Chemical methods include the application of approved herbicides to control specific vegetation problems. TxDOT’s program includes the use of mechanical controls, such as timed mowing and the application of herbicides. The herbicides used in TxDOT’s vegetation management have been extensively researched and have proven to provide the desired control of the target species while presenting the minimum possibility of harm to the environment, the applicator, and to the traveling public. The use of herbicides is a key element to be used in combination with physical vegetation control methods to manage right-of-way vegetation.

There are many pesticides being registered by the Environmental Protection Agency (EPA) for both agricultural (crop) and right-of-way (non-crop) situations. Many of these products have proven to provide excellent benefits to the vegetation manager in controlling and/or suppressing specific vegetation problems along the transportation system.
2.0 | VARIABLES AFFECTING HERBICIDES

Herbicide activity may be affected by many factors including:

- Species of target plant pest being treated
- Soil Type
- Wind
- Humidity
- Rainfall
- Temperature
- Water Quality
- Mixing & Application Procedures & Timing of Applications
- Individual Herbicide Applicator

2.1 | Type and Species of Plants to be Treated

The selection of appropriate herbicides, with the proper application rates and application methods, is dependent upon the type and species of the plants to be controlled and the condition of the plant itself. Some plant species are more resistant to certain herbicides than others. The plant may be in either an active growth or a dormant stage. Plants are categorized as an annual, biennial or perennial. The category of plant can affect the ability of the herbicide to control the plant. The plant may be a seedling or a mature plant. The plant may be in the process of budding, leafing, flowering or fruiting. Each of these conditions is a component in determining how herbicides work and should be considered when deciding what herbicide(s) to use, where to use them and when to use them.

For example, the best time to apply a foliar herbicide for the control of Johnsongrass is when the plant is young, green and actively growing. The best time to apply this in the early stages of the Johnsongrass plants life and after mowing. In general, seedling plants (immature plants just emerging) are much easier to control than established or mature plants.

2.1.1 | Annual, Biennial and Perennial Plants

Both annuals and biennials originate from seed (not from permanent rootstock). Annuals complete their entire life cycle in one growing season (or year/seed to seed). Barnyard grass, crabgrass, and foxtail millet are examples of annual plants that are often seen on the TxDOT right-of-way. Biennial plants require two years to complete their life cycle. Most thistles are biennial, producing a rosette in their first season and the readily recognized flower during their second season of life.

Perennial plants live for more than two years and have extensive root systems. Perennials also produce seed to help ensure survival of the species. Generally higher rates of herbicides will control perennial plant species. Johnsongrass is a common perennial on TxDOT ROW’s.
2.1.2 | Aquatic Plants

Aquatic plants can be annual, biennial or perennial, are associated with water and/or wetland areas, and typically have large, glossy, waxy leaves or a hairy surface. For aquatic plant control, TxDOT utilizes Approved Aquatic Herbicides. These herbicides have been approved by the EPA for the broad-spectrum control of vegetation within or adjacent to aquatic sites. An aquatically approved surfactant must be added to the Approved Aquatic Herbicide. The surfactants stocked in the TxDOT Regional Warehouses are aquatically approved. The TxDOT Herbicide Program uses several aquatic approved herbicides. They include Rodeo®, AquaMaster® and RoundUp Custom®, which are glyphosate products. Rodeo®, AquaMaster® and RoundUp Custom® all have a higher concentration of glyphosate than RoundUp ProMax® and no surfactant. Other Approved Aquatic Herbicides products such as Vastlan® and Imox™ use different active ingredients. The Vastlan® active ingredient is Triclopyr-choline while the Imox™ active ingredient is Imazamox. Vastlan® should be used to chemically prune/side-trim in areas in or adjacent to water for Function Code 552 applications. Imox™ is used as a Spring application to treat Georgia/Giant Cane (Arundo donax). All products used by TxDOT herbicide applicators have been extensively tested and researched by the Maintenance Field Support Staff before being released for use in the field.

2.2 | Soil Type

Proper application rates as recommended within this document normally produce excellent results. Soil type, however, has an effect upon how well all herbicides work. Soil-active (residual) herbicides are more effective in soils that are low in clay or organic matter, such as sandy soils. In high clay soils, herbicide molecules attach (adsorb) to the clay particles and are not available for plant uptake. Therefore, in heavy clay soils, the application rates may need to be increased, within the limits of the product label for a soil-active (residual) herbicide. Always check with the Maintenance Field Support Section before changing any herbicide rates not found in this document.

The acidity or alkalinity of soils also has an effect upon the performance of herbicides. For example, in relatively acidic soils, often found within parts of East Texas, Outrider® decomposes at a faster rate (thus providing a shorter residual period) than it does in the more alkaline soils commonly associated with central and West Texas. **EsplAnade® 200SC is the herbicide used exclusively for it’s soil residual properties.**
2.3 | Wind Velocity

Wind will always disturb the spray pattern and blow herbicides away from the target area causing spray drift. High winds can blow an application several feet away from the target. The effects of wind distortion are greater if the spray pattern is wider, the nozzle is higher from the ground, the droplet is smaller, and the spray pressure is higher. The best time to spray is before the wind velocity rises (i.e. early in the morning). The addition of the proper drift control will help reduce drift. Control WM™ and Droplex® may reduce spray drift sufficiently for spraying to continue, however, if wind velocities rise to the point that the pattern cannot be kept on target, spraying in that area should be discontinued. If wind speeds rise past the speed that a label directs, spraying should also be discontinued.

For purposes of deciding whether to spray and for record keeping, always carry a wind gauge (anemometer) in the spray unit. Document a single wind speed (i.e. 5 mph) instead of a range (i.e. 3-8 mph). Spray operations should not be conducted whenever wind conditions are calm. Some products, such as Roundup PROMAX® (RUPM) specify wind conditions be at least 2 mph to prevent wind inversions. Winds over 5 mph may cause drift. Spraying operations should cease when winds are of such intensity that you cannot keep your spray on the target or wind velocity exceeds the label directives. You can find another area to spray, as long as you can keep your spray on target and the wind speed does not exceed the maximum wind speed stated on the herbicide label.

2.4 | Humidity

Relative humidity is defined as the percent of moisture in the surrounding air relative to the maximum amount that the atmosphere can hold.

Generally, the higher the relative humidity at the time of application, the more rapidly plants will absorb foliar-applied herbicides. However, when relative humidity approaches 100 percent, rainfall will likely occur and the chance that the herbicide will be washed from the foliage increases. Consequently, herbicides should not be applied when rainfall is threatening, is imminent or if there is moisture on the surface of vegetation.

Too little humidity can affect the absorption of foliar-applied herbicides. Plants will close their stomata to limit water loss. When plants close their stomata, it is harder for herbicides to be absorbed into the plant and work.

2.5 | Rainfall

Rainfall affects chemical control of vegetation in many ways. Rainfall acts as the vehicle that carries soil-active (residual) herbicides into the root zone of plants. Residual chemicals, in order to enter the root system of the target species, must be in solution. Excessive soil moisture may move (leach) the residual herbicide below the root zone and result in poor control. Moisture from rainfall, thawing cycles, and snow may prevent the herbicide from entering the soil in concentrations necessary to achieve the desired degree of control. Moreover, excessive rainfall may lead to serious herbicide damage to vegetation outside of the target area.

Do not spray herbicides during rainfall or when rainfall is predicted within 1-2 hours after application. Rain will wash herbicide off the foliage of the target species before it can be absorbed by the plant. Conversely, after a rain, dust on the foliage will have been washed off and foliar-applied herbicides can be easily absorbed by the plant. Allow the foliage time to dry after a heavy dew or rain before conducting spraying operations as wet foliage may also yield poor results.
2.6 | Temperature

Temperature can affect the action of herbicides and the degree of control achieved. Do not apply herbicides when the soil is frozen, when rain or snow is falling, or when there is snow on the ground. High temperatures, typical during the hot-dry summer months, cause many plant species to become dormant. When these conditions occur, plants will not absorb herbicides and control will be reduced.

2.7 | Water Quality

Water is an important factor affecting the action of all herbicides, especially when applying the herbicide Roundup PROMAX®. Always use the cleanest water available to mix herbicides, as impurities and soil particles in the water will bind or “tie up” the herbicide molecules and deactivate the chemical. Additionally, Outrider® decomposes faster in acidic water. For those instances where acidic water must be used, mix smaller batches to prevent Roundup PROMAX® and Outrider® from becoming ineffective.

Impurities in the water, such as sand or clay particles, may also clog filters and damage centrifugal pumps, electric solenoids and nozzles.

How A Plant Takes In Herbicides (Residual/Soil-Active)

Foliar Applications = Herbicides Travel Through Leaves

Soil Residual = Herbicides Travel Up Through Roots
2.8 | Application Methods and Timing

Proper application methods and timing of your spray operations are essential to the success of all herbicide application programs. Residual herbicides must be applied uniformly. Do not make residual herbicide applications when rain is not expected for an extended period of time. Although, the application does need time to bind with the soil particles, rain is needed to move the residual herbicide into the soil. However, rain immediately following an application containing a residual herbicide may run-off, causing damage to desirable vegetation.

Foliar-applied herbicides must be applied uniformly to the surface of the foliage of the target species. Both residual and foliar-applied herbicides require proper timing for proper control and effective performance of the chemical.

SECTION 3

3.0 | TYPES OF HERBICIDES

Residual herbicides should NEVER BE APPLIED TO BARE GROUND. Vegetation should always be present before applying residual herbicides to avoid herbicide build-up and erosion. Spot applications to green vegetation in the edge can be made throughout the year.

3.1 | Soil-Active (RESIDUAL) Herbicides

Residual herbicides remain active within the soil for a period of time and prevent germination of seeds and/or growth of roots. Residual herbicides are moved into the root zone by rainfall. The herbicide is absorbed by the plant’s root system and is distributed (translocated) throughout the plant. Plant growth processes are then affected. Toxic symptoms should begin to appear within several days.

The swiftness of how soon toxic symptoms begin to exhibit within the plant varies with the type of soil, rainfall rates, plant species, and the rate of herbicide actually applied. Residual herbicides can be applied to the soil in the winter months prior to or shortly after the initial emergence of new growth in the early spring. Do not make residual herbicide applications when rain is not expected for an extended period of time. Although, the application does need time to bind with the soil particles, rain is needed to move the residual herbicide into the soil. However, rain immediately following an application containing a residual herbicide may run-off, causing damage to desirable vegetation.

3.2 | Foliar-Applied Herbicides

Foliar-applied herbicides, as the name implies, must be applied to the green and actively growing foliage of the target species in order to be effective.
The herbicide is absorbed through the foliage and moved (translocated) throughout the plant and stored in the root system. Several days are typically required before the toxic effects of the herbicide appear. Repeat applications of foliar-applied herbicides may be necessary, as most foliar-applied herbicides used by TxDOT have a short soil residual activity or no soil activity at all.

Additionally, certain plant species may be harder to control with a herbicide, requiring either additional applications or the use of more than one herbicide in combination if broad-spectrum control is required.

SECTION 4

4.0 | TYPES OF CONTROL

Complete control may be achieved by using a mixture of Roundup PROMAX® at 3 quarts per acre plus EsplAnade® 200 SC at 4 ounces per acre. Bare ground is not recommended under guardrails, or around signage, delineator posts, mailbox supports, etc.

4.1 | Bare Ground (COMPLETE) Vegetation Control

Bare ground situations may be appropriate where there is no desire or need for vegetation. Treating the edge of pavement or vegetation encroachment within paved shoulders are good examples where bare ground herbicide applications may be appropriate.

Continuous bare ground treatment, especially on sloped areas increases the potential for erosion and sediment loss. For those areas that receive bare ground herbicide applications, additional spot-treatments may be necessary for plants that have "broken through" the bare ground treatment."

Applications to the edge of pavement should not be any wider than 6 inches from the edge of the paved surface. Bare ground applications behind guardrails should be no further than 18 inches behind the guardrail. Each District determines if their guardrails will be bare ground.

Application of an excessive quantity of herbicide is not economical and may result in damage to nearby desirable vegetation.

4.2 | Selective Weeding

Selective weeding is the use of a herbicide or a combination of herbicides for the control of specific target plant species. Using herbicides selectively does not permanently harm desirable vegetation. Herbicides used for this type of control may be selective or low rates of non-selective herbicides. Examples would be Roundup PROMAX® plus Outrider® at 8 ounces per acre plus 1.33 ounces per acre for the control of Johnsongrass, Escort® XP at a 1 ounce per acre rate for the control of Field Bindweed and Common Sunflower, Transline® at 10 ounces per acre rate for the control of weeds such as Musk Thistle and Vista® XRT at 10 ounces per acre plus surfactant at the rate of 2 quarts per 100 gallons of water for Giant Ragweed control.
4.3 | Chemical Mowing

Chemical mowing is the practice of using Roundup PROMAX® to control undesirable vegetation which is in close proximity to desirable plants. This procedure may be utilized to control vegetation along fence lines, under guardrails, and within landscaped areas.

Chemical mowing is most often performed by using Roundup PROMAX® at the proper rate for the type of control desired.

SECTION 5

5.0 | EQUIPMENT

5.1 | Model 85 Spray Unit (FOD Issue)

The Model 85, which was initially produced within the General Services Division shops in 1985, is the spray unit that is currently used.

The Model 85 Spray Unit uses an electrically activated spray head called a Flex-Five spray head to spray wide areas of the right of way.

As shown in Figure 3, the Flex-Five spray head consists of five, independently operated nozzle groups.

Nozzle Group 2 includes two 6520G nozzles. Nozzle Group 3 has one 2520G nozzle. Nozzle Group 4 includes one 2520G nozzle and two 1520G nozzles. Nozzle Groups 5 and 6 both include three 0020 nozzles.

The spray pattern adjusts vertically by an electric cylinder operated from the control panel in the vehicle. This adjustment permits the applicator to maintain a constant spray width even on sloping terrain. Although wind affects all spray patterns, the flex-five spray head is designed to be able to spray wide areas (approximately 36-40 feet), as seen in Figure 4.
Example of nozzle sizes: Nozzle number 6520 directs the spray pattern at a 65 degree angle and distributes 2 gallons of solution per minute.

Flex-5 Spray Head

Figure 5

5 Nozzle Banks

Spray Pressure is 30 psi

Pre-Calibrated to 25 Gallons per Acre

Spray Speed is 11.4 Miles per Hour

THE FLEX-5 SPRAY HEAD
As seen in **Figure 6**, this unit is distinguished by a spray head system, which includes a 50-mesh in-line filter, followed by the main pressure gauge and a series of six, in-line electric solenoids. On the downstream side of each of the electric solenoids, are flow regulators and pressure gauges.

At the downstream side of the last, in-line electric solenoid, is the by-pass pressure regulator, which permits return of excess fluid to the main tank during spraying operations.

The main difference between the Modified, newer Model '85 unit and the older unit is that the solenoids and flow regulators have been “switched” around. This helps with the repair and replacement of solenoids, which need to be checked on a regular basis. Also on the newer Model '85 unit the return hose to the tank and pressure relief valve have been eliminated.
Model 85 (Modified) Spray Head

Figure 7

Electric Solenoids

Pressure Guages

Stainless Steel Manifold

Pressure Regulator Valves

Main Pressure Guage

Front In-Line Filter
5.1.1 | Fixture Operations

The fixture operation does not utilize an electrically or hydraulically operated boom system, but includes an arrangement of nozzles for spraying outside of the guardrails, under the guardrails, inside, middle and edge of pavement on the right or the left hand sides of the vehicle. These units were fabricated within the General Services Division shops.

As seen in Figure 8, the fixture spray operation is capable of spraying with the Inside, Middle, Edge and Outside nozzle depending on need. Use Turbo Drop nozzles for both the Inside and Middle of a pavement application, a Turbo Drop nozzle for edge work, two-OC08’s for guardrail work, and a 6508 and 2508 for outside spraying around shoulders, guardrails, delineators, signs, etc.

The fixture nozzles are not used to spray wide areas of the right of way.

Each nozzle/set of nozzles on the Fixture boom, that has a brass nozzle should have a diaphragm check valve. The purpose of the diaphragm check valve is to eliminate drips when nozzles are not in use. Most of the vehicles are now fitted with the 17 PSI diaphragm check valve. These vehicles should be set to 30 PSI. If the vehicle still has the original 30 lb diaphragm check valve it should be set to 35 PSI to ensure proper operation of the diaphragm check valves. See Figure 8. As new Flex-5 spray heads are manufactured by GSD, they will have the 2508 and 6508 nozzles removed.
5.2 | Turbo Drop Nozzles

Outside turbo drop nozzles are used to treat the edge of pavement while inside and middle turbo drop nozzles can be used for treating vegetation emerging in the pavement lanes. These nozzles installed will change your driving speed from 5 MPH to 10 MPH, therefore cutting application time in half. Calibration for these nozzles is the same except speed should be calculated at 10 MPH instead of 5 MPH. These nozzles have NIGP codes and can be ordered through the TxDOT Regional Warehouses. Please call the Maintenance Field Support Section Staff for any additional details concerning these nozzles.

Turbo-Drops

Figure 9

6 Turbo Drop Nozzles at Front of Truck at 30 PSI While Spraying

Turbo Drop Speed is 10 MPH & Should Be Calibrated ANNUALLY
**Fixture Boom Nozzles**

Figure 10

6 Fixture Boom Nozzles

1-2508

1-6508

2-0C08

**Fixture Boom Speed is 5 MPH**

**Spray Pressure is:**

35 PSI for 30 lb Diaphragm Check Valve

30 PSI for 17 lb Diaphragm Check Valve

**NOTE:** All new Flex-5 spray heads will have the 2508 and 6508 nozzles removed.
5.3 | Wiper Applicators

Rope-wicks are generally used for thin stands of undesirable vegetation. When an undesirable stand of vegetation exceeds 35 percent of the ground surface, use the overspray operations of the herbicide spray unit. Before using the rope-wick check to make sure all of the ropes are wetting. Check possible sources of obstructions in the lines from tank to rope. The ropes used on the rope-wick should be polyester over acrylic ropes.

DO NOT wipe desirable vegetation with rope wick or wiper applicators.

The herbicide mixture rate is a 33% solution that is made using two parts water to one part Roundup PROMAX®.
SECTION 6

6.0 | SURFACTANTS

6.1 | General Characteristics of Surfactants

Surfactants are surface-active agents. They are useful as wetting or spreading agents. They act by increasing the contact between the liquid (i.e. herbicide/surfactant mixture) and the leaf surface of the pest plant, usually by reducing the surface tension of the spray droplets. Therefore, surfactants enhance the activity of the herbicide. An example of this can be seen when a drop of water is applied to a waxy leaf; it beads up. However, if detergent is added to the water first, then the droplets will spread out over the leaf. In this case the detergent is a surface-active agent, or a surfactant. You as a TxDOT Herbicide Operator are most familiar using non-ionic surfactant in any mixes that do not contain Roundup PROMAX®. However, Methylated Seed Oil (MSO) has been introduced to treat Bastard Cabbage with an overspray application, instead of the usual non-ionic surfactant. Phase Methylated Seed Oil (MSO) is available in the RDC's. MSOs should be used when making overspray applications for Bastard Cabbage. MSO will be used instead of the non-ionic surfactant. Methylated Seed Oil allows our application speed to remain 11.4 miles per hour and apply the recommended 2 ounces per acre of Escort XP® to the Bastard Cabbage.

6.2 | Mixing Rates for Department Stocked Surfactants

Applications using larger amounts of Roundup PROMAX® do not require the addition of a surfactant. For example, when using RUPM for Edge of Pavement or temporary bareground applications. The overspray application mix for treating Bastard Cabbage is Escort XP® at 2 ounces per acre plus 1 quart of MSO per 100 gallons of water plus drift control.

However, when using the lower rate of 8 ounces per acre of RUPM, additional surfactant can help the mix work more efficiently.

- In Approved Aquatic Herbicide applications, always add 2 quarts of surfactant per 100 gallons of water.
- For applications of Escort® XP alone, always add 1 quart surfactant per 100 gallons of water.
- When using Target® 6.6, Capstone®, Transline®, and all of the Approved Aquatic Herbicides DO NOT add RUPM to the mix. Always add 2 quarts of surfactant per 100 gallons of water.
- When using Outrider® or Vista® XRT, without Roundup PROMAX®, only add 1 quart of surfactant per 100 gallons of water.
- Not using a surfactant or not using enough can significantly reduce results.
6.3 | Surfactants Approved for Use with Department-Approved Herbicides

All surfactants (both non-ionic and methylated seed oils) received from the regional warehouses meet the approval of the Maintenance Field Support Section Staff in the Maintenance Division. These surfactants are safe for use with Approved Aquatic Herbicide applications sprayed directly in water and also for use with Escort® XP, Transline®, Vista® XRT, Target® 6.6, Capstone®, and Outrider®, when applied alone.

If using surfactants NOT received from a TxDOT regional warehouse, make sure to read the label before using the product. Make sure the product is labeled for aquatic applications if making applications to aquatic areas.

6.4 | Precautions Using ALL Products

Always wear eye protection and gloves when mixing and loading all products associated with herbicide applications. Surfactants, which can be similar to soap, can cause eye and/or skin irritation. Wash hands thoroughly with soap and water after handling ALL products associated with herbicide applications.

Many products used during herbicide applications, including surfactants can be flammable and even combustible. The liquids may quickly evaporate and form a vapor, which can catch fire. Invisible vapor spreads easily and can be set on fire by such sources as pilot lights, welding equipment, electric motors and switches. Keep ALL products associated with herbicide applications away from heat, open flames, sparks and hot surfaces. The fire hazard is greater as the liquid temperature rises. Store and use only in well ventilated areas. Keep container closed when not in use. Clean up spills immediately. Do not weld, heat or drill any containers. Dispose of empty containers immediately according to label directions.

Always read label directions prior to using any product, whether surfactant or herbicide.
7.0 | MIXING

7.1 | Information About Drift Control and Anti-Foaming Agents

Drift control agents reduce drift; they do not eliminate drift. **Winds above 5 mph may cause drift.** Drift control agents reduce the fine particles created by the nozzle tip by increasing droplet size. Drift may still occur if the spray pressure is too high or the wind velocity is too great.

**DO NOT SPRAY HERBICIDES WHEN WINDS ARE TOO STRONG AND SPRAY PATTERN CANNOT BE KEPT ON TARGET.**

*Control WM™* is injected from the drift control injector at the rate of 2 ounces per 100 gallons of water. **DO NOT pour Control WM™ in the top of the tank.**

*Droplex®* can be added to a mix by pouring at the top of the tank, in the conical mixing tank or injected through the drift control injector. The **Droplex rate is 10 ounces per acre for non-aquatic applications and 6 ounces per acre for aquatic applications.**

*Prevent™* Anti-Foam REDUCES foam in the tank. *RoundUp ProMax®* has a tendency to get foamy when added to a tank filling with water. Shake Prevent well before adding to the top of your tank. Add the anti-foaming agent SLOWLY through the tank opening in a crisscross stream across the foam. *Prevent™* is the Anti-Foam agent currently stocked in the TxDOT warehouses. *Prevent™* Anti-Foam rate is 1 fluid ounce per 100 gallons of water.

7.2 | Approved Drift Control and Anti-Foaming Agents

*Control WM™, Droplex®* and *Prevent™* received from the regional warehouses all meet the approval of the Maintenance Field Support Section in the MNT Division for all herbicides.
7.3 | Mixing Order

It is important to have the proper products in an application mix, the herbicide to treat the plant, surfactant to help the droplets stick to the plant, drift control to minimize drift and anti-foamer to decrease foam. However, the order that these products are added to and mixed is just as important.

It is important to always have water in the tank, ¼ of total mix amount is enough. It is important to have the agitators engaged and working when adding all products into the mix.

If dry herbicides are in a mix, they should be added first and allowed to dissolve into solution before adding any liquid herbicides.

All liquid herbicides, except RoundUp ProMax®, should be added and allowed to mix completely AFTER all dry herbicides. RoundUp ProMax® should be the last liquid herbicide added to a mix. RoundUp ProMax® contains surfactant and that surfactant can prevent other products’ particles from dissolving into solution. Undissolved products are not as effective and can clog equipment components.

Once the herbicides are added and dissolved, surfactant should be added. In applications that contain a high rate of RoundUp ProMax® (3 quarts per acre), an additional surfactant is not needed. Applications that contain the lower amounts of RoundUp ProMax® (8-20 ounces per acre) can benefit from additional surfactant.

All applications that do not have RoundUp ProMax® in them should have surfactant added. See Section 6.3 Surfactants Approved for Use with Department-Approved Herbicides for surfactant rates.

Following the addition of RoundUp ProMax® or surfactant (if a low rate of RUPM or no RUPM is added), drift control is required. Drift control should always be added to a mix that is mixed in the main tank of herbicide equipment. For handgun applications, drift control is not required, but it can be helpful, especially if Droplex is the drift control added. Droplex has a penetrant that can aid in the deposition and absorption of the herbicide mix. If Control WM is added, make sure that it is added slowly and well agitated. If Drift Control is added to a tank mix, it MUST be documented in mixing records and application records. Even though drift control does not eliminate drift, it does minimize it and can be considered a mitigating circumstance and decreases the severity possible regulator violations.

SPRAY HERBICIDES ONLY WHEN SPRAY PATTERN CAN BE KEPT ON TARGET.
SECTION 8

8.0 | CALIBRATION

8.1 | Reasons for Calibration

Poor results obtained after a herbicide application may be a result of inaccurate application methods. It is extremely important to calibrate the herbicide spray unit for the different spray operations. The pre-calibration phase involves the inspection of all parts of the spray system and equipment for proper operation and cleanliness. Leaks and drips are the first thing that a TDA inspector will notice.

To calibrate the herbicide spray unit use the following formulas to calculate the gallons per acre (GPA):

GPA = \[
\frac{5940 \times \text{Gallons Per Minute (GPM)}}{\text{Miles Per Hour} \times \text{Spray Width (inches)}}
\]

To find the amount of herbicide to add to the tank, multiply the number of acres by the rate of herbicide.

\[
\text{Acres} \times \text{Rate of Herbicide} = \text{Amount of Herbicide}
\]

For additional examples of calibration procedures, see Section 17 pages 102-126.

Note: 5940 is a constant used to convert gallons per minute, miles per hour, and inches to gallons per acre.

To determine the amount of chemical to add to the herbicide tank, find the number of acres a given batch will spray.

\[
\text{Acres} = \frac{\text{Batch Size (gallons)}}{\text{GPA}}
\]
**Example:**

Overspray application using the 4-way mix. 50 total acres to be treated.

- **RUPM**: 8 ounces/Acre
  
  \[
  50 \text{ Acres} \times 8 \text{ ounces} = 400 \text{ ounces of RUPM}
  \]

- **Outrider®**: 1.33 ounces/Acre
  
  \[
  50 \text{ Acres} \times 1.33 \text{ ounces} = 66.5 \text{ OR 67 ounces of Outrider®}
  \]

- **Escort® XP**: 1 ounce/Acre
  
  \[
  50 \text{ Acres} \times 1 \text{ ounce} = 50 \text{ ounces of Escort® XP}
  \]

- **Vista® XRT**: 10 ounces/Acre
  
  \[
  50 \text{ Acres} \times 10 \text{ ounces} = 500 \text{ ounces of Vista® XRT}
  \]
8.2 | Calibration during Fixture Boom Operations

The nozzles used for fixture applications are located at different heights and spray different width patterns. This results in a variation in GPA from each nozzle. For this reason, an average GPA is sufficient for the required records and mixing procedures.

To determine the GPA, the following procedure should be used:

- Check operating fluids on both truck engine and independent engine.
- Inspect and clean filter screens.
- Add 300 gallons of water to the main tank.
- Open the main valve (from the bottom of the main tank) and bypass valve (located above the manifold on the outflow side of the pump). Also, open the tee-jet agitators located on the manifold.
- Turn independent engine switch on in the cab and after warm up increase throttle from inside of the cab.
- If using Control WM™, add 6 ounces of drift control to the drift control injector and open ball valve to inject the drift control VERY SLOWLY. Do not allow air from drift control injector to enter the spray system. If using Droplex®, add 30 ounces to the tank by using the drift control injector. However, if air does enter and the pump loses prime, open bleeder valve at top of pump to bleed off air.
- To set spray pressure for fixture nozzles, increase the RPM of the independent engine to have 40-50 psi (or enough pressure to run the system properly) on the main pressure gauge with all nozzles spraying. Then loosen lock nuts on the pressure regulators and adjust the stem to achieve 30 psi (or 35 with 30 lb check valves) on all spray pressure gauges while nozzles are spraying. Once spray pressure is set at the proper psi, turn solenoids on and off several times to check spray pressure setting. Then tighten lock nuts on the pressure regulators. Be sure the diaphragm check valves are working when solenoids are turned on and off. The diaphragm check valves are located just above the spray nozzle and stop the nozzle from dripping. The caps on the diaphragm check valves should only be hand tighten to prevent leakage. If they are too tight the valve will not open (you will read spray pressure even if the check valve does not open.
- To calibrate the GPA on the fixture nozzles, catch the fluid from the two upper nozzles (6508 and 2508), for one minute each. Measure the fluid to achieve GPM. Then adjust patterns of these two nozzles to achieve a good pattern with no gaps between the spray patterns. Spray these nozzles together at 5 mph to check the pattern and then measure the width of the spray pattern in inches. (In windy conditions, spray with the wind and measure and then spray against the wind and measure. Average the two spray widths and use this measurement in the calibration formula.)

After measuring GPM and spray width in inches, you are ready to calculate GPA using the following formula:

\[
\text{GPA} = \frac{5940 \times \text{GPM}}{5\text{-mph} \times \text{Spray Width (inches)}}
\]
Once GPA is calculated, the amount of herbicide can be determined by dividing GPA into total gallons of mix desired, which equals total number of acres to be sprayed. Then the number of acres multiplied by the rate of herbicide per acre equals the amount of herbicide to be added to the tank.

Mixing is accomplished by adding the appropriate amount of water to at least ¼ of the tank (total mix amount...if mix is calculated to be 400 gallons, add 100 gallons to the tank before adding any herbicide products) into the tank. Agitators should be turned on and should remain on during the mixing and application. If mix sits for an extended period with the agitators off, such as lunch breaks, make sure to engage the agitators and allow mix to be reconstituted back into solution before spraying the mix. The bypass valve should be in the on position during filling and mixing. When the bypass is on, the water is recirculated back through the tank.

Adding herbicides and surfactant should be done using the conical mixing tank located at the back of the herbicide truck. Truck beds can become slick from splashing water during fillings. By using the conical tank to add products, operators are safer. The bypass valve and the agitators should be on during mixing.

Dry herbicides should always be added before liquid products. To add dry herbicides to a mix, through the conical tank, it is best to make a slurry. To make a slurry, measure out the total amount of dry herbicides needed for the mix, into a larger container that can hold water. Start adding water and stir into the dry product. Add enough water to the container so that the dry herbicide(s) becomes a mix that is easily poured. Pour this slurry into the conical mixing tank. The ball valve/lever for the conical tank is under the truck bed, directly beneath the conical tank, turn this open to allow the herbicide slurry to be pulling into the tank water. Clean water can be added to the conical tank to rinse any slurry residue from the conical sides. Make sure that the conical ball valve is off when the conical tank is empty. It is important to close the conical ball valve to prevent air from being introduced into the pump.

Liquid herbicides should be added to the tank mix next, also using the conical mixing tank. If RoundUp ProMax or surfactant will be added to the mix, they should be added AFTER all other liquid herbicides have been added and allowed to mix into solution. Drift control should be added to the mix after ALL of the herbicides. Control WM MUST be added using the drift control injector. Droplex can be added using the drift control injector or conical mixing tank. If the conical is used, it should be rinsed clean of residue.

Once mixing is complete, keep the bypass open for mix recirculation and the agitators on until the application. The bypass valve should be closed immediately before starting the application. Many operators will turn the bypass valve off while they are collecting weather data at the application site, just prior to spraying. Agitators should be left on during the application. Once the mix is too low in the tank to adequately cover the agitators, agitators should be turned off, to prevent air from being introduced into the pump.
8.2.1 | Examples of Calibrating Fixture Boom

Catch the fluid from all four nozzles for one minute (2508, 6508, 2-OC08’s):

Guardrail nozzle (6508): 112 ounces
All four nozzles caught: 205 ounces

\[
GPA = \frac{5940 \times 1.60 \text{ GPM}}{5 \text{ mph} \times 63 \text{ inches}}
\]

\[
GPA = \frac{9504}{315}
\]

\[
GPA = 30.2 \text{ or } 30
\]

Once the GPA has been calculated, herbicide mixture can be made. The number of acres must be determined per batch size. Then the amount of herbicide can be calculated per batch size, depending on the type of treatment and rate of herbicide.

Drift control needs to be added in the proper sequence. Refer to Section 7.
Example of Calculating for SELECTIVE Vegetation Control:

Using Flex-5 Spray Head

GPA = 25

Rate of Roundup PROMAX® + Outrider® = 8 oz + 1.33 oz per acre

Batch size = 450 gallons of water

Acres = 450 gallons ÷ 25 GPA

Acres = 18

18 acres x 8 oz = 144 oz

18 acres x 1.33 oz per acre = 23.94 = 24 oz

To mix, the applicator adds 144 oz of Roundup PROMAX® + 24 oz of Outrider® to 450 gallons of water in the tank.

Example of Calculating for COMPLETE Vegetation Control:

Using Turbo Drop (11020) Nozzle for Edge of Pavement Application

GPA = 30

Rate of Roundup PROMAX® = 3 quarts per acre plus

Esplanade® 200 SC = 4 ounces per acre

Batch size = 450 gallons of water

450 gallons of water ÷ 30 GPA

Acres = 15

15 acres x 3 quarts per acre = 45 quarts plus

15 acres x 4 ounces per acre = 60 ounces

To mix, the applicator adds 45 quarts (11.25 gallons) of Roundup PROMAX® plus 60 ounces of Esplanade® 200 SC to 450 gallons of water in the tank.
8.2.2 | Examples of Calibrating Fixture with Nozzles

Catch the fluid from edge nozzle for one minute:

Edge nozzle (Turbo Drop)

\[
\frac{128 \text{ ounces}}{128 \text{ ounces/minute}}
\]

Divide 128 ounces per minute by 128 ounces per gallon to achieve 1 GPM

Measure the spray width of all the nozzles.
24 inches

The speed for fixture operations with nozzles is 10 mph

Use the calibration formula.

\[
\text{GPA} = \frac{5940 \times 1 \text{ GPM}}{10 \text{ mph} \times 24 \text{ inches}}
\]

\[
\text{GPA} = \frac{5940}{240}
\]

GPA = 24.75 OR 25

Once the GPA has been calculated, herbicide mixture can be made. The number of acres must be determined per batch size. Then the amount of herbicide can be calculated per batch size, depending on the type of treatment and rate of herbicide.
Example of Calibrating for COMPLETE Vegetation Control:

\[
\text{GPA} = 25 \\
\text{Rate of Roundup PROMAX}^\text{®} = 3 \text{ quarts per acre plus} \\
\text{Esplanade}^\text{® 200 SC} = 4 \text{ ounces per acre} \\
\text{Batch size} = 500 \text{ gallons of water} \\
500 \text{ gallons of water} ÷ 25 \text{ GPA} \\
\text{Acres} = 20 \\
20 \text{ acres} × 3 \text{ quarts per acre} = 60 \text{ quarts plus} \\
20 \text{ acres} × 4 \text{ ounces per acre} = 80 \text{ ounces}
\]

To mix, the applicator adds 60 quarts (15 gallons) of Roundup PROMAX® plus 80 ounces of Esplanade® 200 SC to 500 gallons of water in the tank.
8.3 | Calibrating the Trailer Unit

Calibrating the Trailer Unit is very similar to calibrating the Herbicide Truck, but since this unit runs in the ROW it is operated at a slower speed usually 3 – 5 MPH.

The Trailer Unit consists of a single or tandem axle trailer with a 500 gallon low profile elliptical tank equipped with Tee Jet agitation, gasoline or diesel motor with centrifugal pump, Boom Buster or Boominator broadcast nozzles that spray up to 32 ft., Raven tractor mounted sprayer control with pressure regulator, electric ball valves, filters, hoses and valves.

Example: Boombuster nozzles running at 40 psi and 4 GPM. Ground application speed of tractor is 4 mph. Spray width 32 feet.

Note: 5940 is a constant.

\[
GPA = \frac{5940 \times \text{Gallons Per Minute (GPM)}}{\text{Miles Per Hour} \times \text{Spray Width (inches)}}
\]
1st Catch the fluid from each nozzle for one minute and record in GPM:

Drift control needs to be added in the proper sequence. Refer to Section 7.

2nd Measure the spray width of all the nozzles and record in inches:

\[
GPA = \frac{5940 \times 4 \text{ GPM}}{3 \text{ to } 5 \text{ mph} \times 384 \text{ inches}}
\]

3rd Determine the application speed and record in miles per hour (Recommend 3 to 5 mph for most terrain):

\[
GPA = \frac{5940 \times 4}{4 \times 384}
\]

4th Then, do the math:

\[
GPA = \frac{23760}{1536}
\]

5th Multiply top, then bottom and divide the bottom into the top:

\[
Gallons per Acre (GPA) = 15.5
\]
8.3.2 | Optional Equipment for the Trailer Unit
Options include: Tandem Axles, Fenders, Hose Hudson or Green Garde handgun. Hose Reel (CA32112L) with 200 ft. of ½ hose and

8.3.3 | Trailer Unit Speed Calibration Tables

**Speed Calibration Table I**  
*(Travel 88 feet)*

<table>
<thead>
<tr>
<th>Time (Seconds)</th>
<th>MPH</th>
<th>Ft./Minute</th>
</tr>
</thead>
<tbody>
<tr>
<td>20.0</td>
<td>3</td>
<td>264</td>
</tr>
<tr>
<td>17.1</td>
<td>3.5</td>
<td>308</td>
</tr>
<tr>
<td>15.0</td>
<td>4.0</td>
<td>352</td>
</tr>
<tr>
<td>13.3</td>
<td>4.5</td>
<td>396</td>
</tr>
<tr>
<td>12.0</td>
<td>5.0</td>
<td>440</td>
</tr>
</tbody>
</table>

**Speed Calibration Table II**  
*(Travel 100 feet)*

<table>
<thead>
<tr>
<th>Time (Seconds)</th>
<th>MPH</th>
<th>Ft./Minute</th>
</tr>
</thead>
<tbody>
<tr>
<td>22.7</td>
<td>3</td>
<td>264</td>
</tr>
<tr>
<td>19.5</td>
<td>3.5</td>
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<tr>
<td>17.0</td>
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<td>352</td>
</tr>
<tr>
<td>15.2</td>
<td>4.5</td>
<td>396</td>
</tr>
<tr>
<td>13.6</td>
<td>5.0</td>
<td>440</td>
</tr>
</tbody>
</table>
9.0 | PRECAUTIONS

9.1 | Precautionary Statements

All labels include precautionary statements. Always read the label for safety procedures before using chemicals. Most exposure to herbicides occurs during mixing operations, mainly to uncovered hands, forearms, and face. Exposure can be reduced significantly by wearing gloves, goggles, and long sleeve shirts. Wash hands thoroughly after handling chemicals.

9.2 | Do’s and Don’ts While Applying Herbicides

- **Do read label prior to opening the container. Follow instructions and pay attention to precautions and warnings.**
- **Do store products in original containers.**
- **With DRY herbicides, like Outrider® and Escort® XP, hold the container away from your face to prevent dust from being inhaled. Or mix the dry herbicide with water in a smaller container first to make a slurry.**
- **Do not use soil-active products near desirable susceptible vegetation. In these areas use foliar applied products such as Roundup PROMAX®.**
- **Do dispose or recycle herbicide containers according to label recommendations. Disposal usually consists of triple rinsing the container and punching holes in it, rendering it useless.**
- **It is recommended that the herbicides not be left in the tank overnight, and should not be left for an extended period of time. Always agitate the mix before spraying.** The solution should be used up if an application is not scheduled for several weeks.
- **Outrider® and Escort® XP are unstable in acidic water and should not be left in the spray tank for long periods of time. These products will also break down in high temperatures.**

9.3 | Equipment

When cleaning spray equipment, make certain that the chemical solution does not drain into areas of desirable vegetation or into waterways.

Do not save worn out tips for later use. Throw them away. Keep spares of each type of tip and several diaphragm check valves in the spray unit.

Prior to equipment storage over the winter season, flush tanks, boom, and hoses with several changes of water. Clean all tips and screens. Antifreeze can be circulated through the system to prevent the pump from freezing or locking down if it is not used for a long period.

9.4 | Application Knowledge

- **Drive at the correct speed (10 mph with Turbo Drop nozzles, 11.4 mph when using the flex-five)**
- **Discontinue spraying if wind velocity rises or changes direction. Winds above 5 mph may cause drift. All spraying must cease when patterns cannot be kept on target or if the label states that the application must stop at a certain wind velocity.** The applicator may need to begin application early in the morning, in order to cover as much area as possible, before the wind velocity rises.
- **Discontinue herbicide application if rainfall is threatening. Most of our herbicides are rain fast within 1-2 hours.** Postpone treatment until
favorable conditions are present. Wet soil and/or foliage may yield poor results.

- Do not apply herbicides when ground is frozen.
- Avoid contaminating water in lakes or streams with herbicides not labeled for use in water.
- Use only clean water in the tank. Sand or clay particles will damage the pump, solenoids, and nozzles, and will deactivate Roundup PROMAX®.
- Clean equipment when changing chemicals. Flush with water several times and spray rinsate on as a typical application.

9.5 | Procedures to Follow for a Herbicide Spill

Facilities should be equipped to handle small spill response. Use the following general guidelines:

- Only employees trained in small spill response should be assigned cleanup work. Do not handle the spill before proper personal protective equipment (PPE) is identified. Review the SDS for the spilled substance to identify the spilled material before initiating clean up and to identify proper PPE. Do not attempt to cleanup a spill larger than 25 gallons.
- If the spill cannot be cleaned up within one hour, initiate contact with the district hazardous materials coordinator who will arrange to have a professional emergency response contractor respond. If respiratory protection is required, the facility responder must have a current fit test on record for respiratory protection. Spill control requirements can generally be met if the TxDOT facility has a written and implemented spill prevention countermeasure and control (SPCC) plan. A spill kit should be available in work areas where hazardous materials or waste products are used or stored. The facility should have spill response equipment sufficient to respond to a 25-gallon spill. A small spill response kit (cart or drum) and replacement supplies are available through the department’s warehouse system or through direct purchase.

Types of Absorbents include (ie, kitty litter)

- Cellulose - biodegradable organic absorbents such as recycled paper products and Synthetic pads - typically made of polypropylene. Because waste sorbents generated during a small spill cleanup are classified by TCEQ as a special waste, use the following criteria for disposal: Only small amount of this waste can be placed in the dumpster at any one time. The amount would be the equivalent absorbent material necessary to contain and clean up a spill of one-gallon of liquid or less. If the sorbent material is not saturated to the point of containing free-liquids, dispose of waste sorbents in dumpsters. Sorbent waste generated as a result of a large-sized spill should be collected and containerized in a drum or other suitable container for later characterization and disposal. Keep the records of spills as directed by your SPCC Plan, using the form in your facility’s SPCC plan.

- Always have a spill kit in every piece of herbicide equipment.

9.6 | Preventing Lateral Movement of Soil Residual Herbicides

Lateral movement is the outward or side movement of a herbicide (several inches or feet) from the target area where it was applied. This occurs with soil residual herbicides when the applicator applies too high of a rate of a soil residual herbicide, when the soil is sandy, when the area sprayed is on a slope, or when rainfall moves the herbicide. To prevent lateral movement of herbicides use the following precautions:

- Apply at the proper rate.
- Reduce rates applied to sandy soils.
- Avoid application to slopes with soil residual herbicides.
- Do not apply during rain or when a heavy rain is expected.
- Do not apply to water-saturated soils.
10.0  TOXICITY

The objective of using herbicides is to control a particular vegetation problem without creating environmental or health hazards.

Signal words are required for all registered pesticide products, herbicides included, that TxDOT uses in the roadside vegetation management program. Signal words describe the short-term (acute) toxicity of the pesticide product. The signal words are either CAUTION, WARNING, or DANGER. Signal words are required to appear on the front panel of the pesticide label.

CAUTION indicates that the pesticide is slightly toxic or almost non-toxic if eaten, absorbed through the skin, inhaled, or it causes slight eye or skin irritation.

WARNING means the pesticide is mildly irritating or moderately toxic if eaten, absorbed through the skin, inhaled, or it causes moderate skin or eye irritation. Vista® XRT and Vastlan® are the only herbicides in the TxDOT roadside management program labeled as WARNING. These products can cause substantial but temporary eye injury.

DANGER indicates that the pesticide is highly toxic through at least one way of exposure.

Safety equipment (eye protection, gloves, long sleeve shirt, pants, socks, shoes, and dust mask where appropriate) should always be worn when working with concentrated herbicides or spray additives and when using the handgun or a backpack sprayer, regardless of product signal word(s).

All herbicides approved by the Texas Department of Transportation for use in roadside vegetation management are labeled as either CAUTION or WARNING and classified as either \textit{slightly toxic (rating 3)} or \textit{almost non-toxic (rating 4)} in terms of the acute oral toxicity. They are also classified as either \textit{mildly irritating (rating 3)} or \textit{non-irritating (rating 4)} to the skin.

Precautionary Statements

\textbf{Hazard to Humans and Domestic Animals}

\textbf{WARNING}

\textit{Causes Substantial But Temporary Eye Injury. Wear Protective Eyewear. Prolonged Or Frequently Repeated Skin Contact May Cause Allergic Reactions In Some Individuals. Do not get in eyes or on clothing. Avoid contact with skin.}

Keep out of reach of children.

\textbf{CAUTION!}

\textit{Causes Moderate Eye Irritation. Avoid contact with eyes or clothing. Avoid breathing vapor or spray mist.}
An “Oral LD-50” is a measure of the concentration of a particular substance that is necessary to kill 50 percent of the test animals. Oral LD-50 is normally measured in milligrams of the product per kilogram (parts per million) of body weight of the test animal.

The following table relates the relative toxicity of TxDOT-approved herbicides as compared to commonly used items:

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Common Trade Names</th>
<th>Oral Toxicity Rating</th>
<th>Dermal Toxicity Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aspirin</td>
<td>for comparison</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Table Salt</td>
<td>for comparison</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Table Sugar</td>
<td>Sucrose</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Glyphosate</td>
<td>Roundup PROMAX®</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Indaziflam</td>
<td>EsplAnade® 200 SC</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Sulfosulfuron</td>
<td>Outrider®</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Monosodium acid methanearsonate</td>
<td>Target® 6.6</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Metsulfuron methyl</td>
<td>Escort® XP</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Fluroxypyr-meptyl</td>
<td>Vista® XRT</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Triclopyr</td>
<td>Pathfinder® II</td>
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<td>3</td>
</tr>
<tr>
<td>Clopyralid</td>
<td>Transline®</td>
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<tr>
<td>Methoprene</td>
<td>Altosid® XR</td>
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<tr>
<td>Triclopyr, Choline Salt</td>
<td>Vastlan®</td>
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</table>
SECTION 11

11.0 | PROTECTED PLANT SPECIES

11.1 | Management of Protected Plant Species

There are 17 protected species on the TxDOT right-of-way. Plants that are species of conservation concern may be listed as threatened or endangered under the Endangered Species Act and/or state law.

Some of the plants are protected under the Federal Endangered Species Act, while others may be protected under the authority of state law. And some are protected under both. Regardless of protected status, TxDOT takes great care to protect these plant species as well as several others that are not listed but have dwindling habitat.

All maintenance in these areas should be coordinated with the Maintenance Division’s Field Support Section and the Texas Parks and Wildlife Department. All maintenance in these areas must protect and preserve these protected plant species.

The following table lists these plant species, classification and county where they are located:

<table>
<thead>
<tr>
<th>Species Name</th>
<th>Classification</th>
<th>County</th>
</tr>
</thead>
<tbody>
<tr>
<td>Davis’ Green Pitaya</td>
<td>Endangered</td>
<td>Brewster</td>
</tr>
<tr>
<td>Nellie Cory Cactus</td>
<td>Endangered</td>
<td>Brewster</td>
</tr>
<tr>
<td>Tobush Fishhook Cactus</td>
<td>Endangered</td>
<td>Kimble, Kinney, Uvalde, Val Verde</td>
</tr>
<tr>
<td>Zapata Bladderpod</td>
<td>Endangered</td>
<td>Zapata</td>
</tr>
<tr>
<td>Ashy Dogweed</td>
<td>Endangered</td>
<td>Zapata</td>
</tr>
<tr>
<td>Texas Trailing Phlox</td>
<td>Endangered</td>
<td>Hardin, Polk</td>
</tr>
<tr>
<td>Slender Rush Pea</td>
<td>Endangered</td>
<td>Kleberg, Nueces</td>
</tr>
<tr>
<td>Texas Poppy Mallow</td>
<td>Endangered</td>
<td>Runnels</td>
</tr>
<tr>
<td>Texas Wild-rice</td>
<td>Endangered</td>
<td>Hays</td>
</tr>
<tr>
<td>Navasota Ladies-tresses</td>
<td>Endangered</td>
<td>Brazos, Grimes</td>
</tr>
<tr>
<td>South Texas Ragweed or Ambrosia</td>
<td>Endangered</td>
<td>Kleberg, Nueces</td>
</tr>
<tr>
<td>Walker’s Manioc</td>
<td>Endangered</td>
<td>Hidalgo</td>
</tr>
<tr>
<td>Texas Golden Glade Cress</td>
<td>Endangered</td>
<td>Sabine, Nacogdoches</td>
</tr>
<tr>
<td>Pecos or Puzzle Sunflower</td>
<td>Threatened</td>
<td>Pecos</td>
</tr>
<tr>
<td>Lloyd’s Mariposa Cactus</td>
<td>Threatened</td>
<td>Brewster</td>
</tr>
<tr>
<td>Neches River Rose Mallow</td>
<td>Threatened</td>
<td>Cherokee, Houston, Trinity</td>
</tr>
<tr>
<td>Johnston’s Frankenienia</td>
<td>Delisted</td>
<td>Zapata, Starr</td>
</tr>
<tr>
<td>White Bladderpod</td>
<td>Endangered</td>
<td>San Augustine</td>
</tr>
<tr>
<td>Rough-stem Aster</td>
<td>Protected by TxDOT</td>
<td>Anderson, Henderson, Smith, Van Zandt, Wood</td>
</tr>
<tr>
<td>Bailey’s Ballmoss</td>
<td>Protected by TxDOT</td>
<td>Kenedy</td>
</tr>
</tbody>
</table>


12.0 | LAWS AND REGULATIONS

12.1 | Texas Department of Agriculture (TDA)

Application of all herbicides and spray additives will be made in a manner consistent with all current and pertinent laws and regulations, including product label.

The Texas Department of Agriculture (TDA) is the state agency responsible for regulating pesticide use. TDA does this by enforcing the Texas Pesticide Laws (Chapter 76, Pesticide and Herbicide Regulation of the Agriculture Code) and Rules (Title 4, Chapter 7, Pesticides of the Texas Administrative Code.)

TxDOT currently has a Memorandum of Agreement (MOA) with TDA that allows TxDOT to train and test TxDOT personnel.

- Texas Department of Transportation and Texas Department of Agriculture Memorandum of Agreement 1995 (See Pages 40 - 41)
13.0 | HERBICIDE SPRAYING OPERATIONS

13.1 | General Information

The purpose of the herbicide spraying operations is to control noxious and invasive plants that may cause a safety concern and compete with desirable vegetation on the right-of-way. An effective spraying program has been shown to reduce mowing cycles, mowing cost and improve the overall condition of the highway system.

It is very important that application timing guidelines are followed to ensure that spraying operations do not affect the emergence and growth of wildflowers.

Please refer to Sections 15.1.6, Section 15.3.1 and Section 15.4.3.

Herbicide spraying operations must be coordinated with mowing operations to be effective.

13.2 | Bare ground Applications

Bare ground applications are herbicide treatments to the edge of pavement and vegetation encroachment within paved shoulders, retaining walls and paved and raised medians. The recommended application rate for these treatments is 3 quarts per acre of Roundup PROMAX® plus Esplanade® 200 SC at 4 ounces per acre to provide for control of edges. Edge of pavement applications are generally made from March thru October. The most effective applications to control bermudagrass are generally made later in the recommended spray schedule.

A handgun application of 6 quarts of Roundup PROMAX® plus Esplanade® 200 SC at 4 ounces per 100 gallons of water may be made to concrete structures and riprap. Runoff of Esplanade® 200 SC will be reduced by avoiding applications when rainfall is forecasted to occur within 48 hours of the application. Soil-residual herbicides need time to attach to the soil before rainfall is experienced. Soil-residual herbicides also need rainfall to move into the soil to be effective. Bare ground applications should be made when rain is expected within a week to 10 days.

These applications should be restricted to no more than 6 inches from to the edge of the paved surface and 12 inches behind the guardrail. Applications wider than 12 inches may result in erosion and soil sediment loss.

Reference: Section 4.1, Section 7.3, Section 14.7, Section 15.1.11, Section 15.2

13.3 | Guardrail Applications

Each district decides if their guardrail is going to be bare ground. The recommended herbicides and application rates are 8 ounces of Roundup PROMAX® plus 1.33 ounces of Outrider® plus 1 ounce of Escort® XP (when Bahia grass is not desirable right-of-way vegetation) plus 10 ounces of Vista® XRT per acre. If Bahia grass is desirable, do not use Escort® XP on the right-of-way. These applications are generally made from May thru October, but Escort® XP and Vista® XRT applications in the right of way should be discontinued after July 31st.
Bare ground herbicide applications to control winter annuals (such as ryegrass, mustards and turnip weed) along guardrail are recommended in the spring to improve visibility of the guardrails.

Non-bare ground guardrail applications for winter annuals should consist of 1 quart of **Roundup PROMAX**® per acre plus 4 ounces of **Esplanade**® 200 SC per acre.

**13.4 | Noxious Weed Control**

Broadcast herbicide applications are required to control noxious weeds on the right-of-way such as Johnsongrass, Switchgrass, Giant Ragweed, Sunflowers, Field Bindweed and other broadleaf weeds. The recommended herbicides and application rates are 8 ounces of **Roundup PROMAX**® plus 1.33 ounces of **Outrider**® plus 1 ounce of **Escort**® XP plus 10 ounces of **Vista**® XRT per acre. These treatments are also recommended to treat guardrails, signs and delineators when grasses are desired around and under these structures. Applications are generally made from May through October; however, **Escort**® XP and **Vista**® XRT should be discontinued after July 31.

*Reference: Section 4.2, Section 7.4, Section 7.5, Section 14, Section 15.3.1, Section 15.5.2, Section 15.8.3*

Broadcast and spot applications of **Transline**® in the spring (January through April) may be necessary to control Musk Thistle. Application rates are 10 ounces per acre applied as a broadcast application and 10 ounces per 100 gallons of water for spot treatments. Spot applications are recommended in areas where large populations of wildflowers exist.

*Reference: Section 7.8, Section 15.6.2*

In some cases, it will be necessary to make herbicide applications with the handgun to noxious plants that cannot be sprayed with broadcast application equipment. To determine the proper herbicide application rate, find recommended rate per acre in this manual or in the manufacturer’s product label. Add the recommended rate of the herbicide to 100 gallons of water for handgun use. In instances when **Roundup PROMAX**® is not used, surfactant is also recommended.

*Reference: Section 15*

**13.5 | Brush, Tree Control, and Chemical Pruning – Function Code 552**

Low volume foliar and basal bark herbicide applications will be necessary to control brush and trees such as Mesquite, Huisache, Retama, and Kudzu on the right-of-way.

Low volume foliar treatments are made using a solution of 2 quarts/100 gallons water **Transline**® plus 21 ounces/100 gallons of water surfactant applied with a handgun equipped with a X-6 spray.
tip. The application should be made uniformly over the entire plant. These treatments are generally made in mid-summer through fall.

Chemical pruning (also known as side trimming) woody plants and tree limbs encroaching in the clear zone on the state’s right-of-ways with the herbicide Capstone®. With the Flex-5 spray head, woody plants can be controlled with Capstone® at 6 pints per acre plus surfactant at the rate of 2 quarts per 100 gallons. Capstone® can be applied at any time during the growing season when the woody plants are actively growing with adequate foliage. However, it’s best to chemically prune vegetation in the fall before trees and brush leaves change color and defoliate.

In areas where there are a lot of undergrowth around the trees that would otherwise need to be trimmed mechanically add Vista® XRT, at 10 ounces per acre to the Capstone® at 6 pints per acre plus the addition of surfactant at the rate of 2 quarts per 100 gallons.

13.6  |  Aquatic Weed Control

Handgun herbicide applications are often necessary to control aquatic vegetation. Approved Aquatic herbicides should be used when there is standing or running water present. Aquamaster®, RoundUp Custom®, and Rodeo® are Approved Aquatic glyphosates and can be applied in aquatic areas. A handgun application at the rate of 8 quarts per 100 gallons of water of Approved Aquatic glyphosate plus aquatic approved surfactant at 2 quarts per 100 gallons of water is recommended to control undesirable vegetation in standing and/or running water.

For chemical pruning/side trimming in aquatic areas, Vastlan® should be used at a rate of 1 gallon per acre plus 2 quarts of aquatic approved surfactant per 100 gallons of water.

Stands of Arundo donax can be treated with a 2% solution of the Aquatic Approved glyphosate plus 2 quarts of surfactant per 100 gallons with a handgun. In the spring, a handgun application of a 1.5% solution of an Approved Aquatic Imazamox product (Clearcast® or Imox™) with a 2% solution of the Approved Aquatic glyphosate and 2 quarts of surfactant per 100 gallons of water has proven an effective, but slow application.

Reference: Section 7.6, Section 15.4
14.0 | NOXIOUS WEEDS ON THE RIGHT-OF-WAY

14.1 | General Information
A variety of plants are considered pests along the highway right-of-way. Pest plants are generally those species that pose safety, maintenance, or public relation problems for the Department.

The predominant pest species in Texas include Johnsongrass, Giant Ragweed, Musk Thistle, Sunflower, Field Bindweed, Bermudagrass, Mesquite, Huisache, Retama, Georgia Cane, Kochia, Russian Thistle, Switchgrass, Turnip Weed, Morning Glory Vine, Western Bitterweed, African Rue, Cattails, Saltcedar, Wildoats, Jointed Goatgrass and Kudzu.

Some of these are native to Texas while others are introduced species that have become naturalized, taking advantage of environmental disturbances to invade and become established in the highway right-of-way. Minimizing disturbance caused by construction or maintenance activities is the best way to reduce the spread of such species. However, once these species become established in an area of the right-of-way which must be maintained, properly selected and applied herbicides may be used to control the weed and re-establish desirable vegetation, such as native grasses and wildflowers.

This section addresses important characteristics of the major pest plants of concern to the Department, and the recommended methods for their control.

14.2 | Johnsongrass
Johnsongrass (Sorghum halepense) is a perennial grass, which may grow to approximately six feet tall. It spreads vigorously by rhizomes (i.e. underground runners) and by seed. It flowers throughout the growing season under favorable growing conditions. Most Johnsongrass plants, however, mature and flower later in the growing season. Johnsongrass is commonly found growing along roadides, in ditches, open areas, fields and waste places.

Johnsongrass is most effectively controlled using overspray applications with Outrider®. Outrider® either by itself, in combination with RoundUp ProMax® or in the three/four-way mix with Escort® XP and Vista® XRT can be used to treat Johnsongrass. (Overspray applications containing Escort® XP or Vista® XRT should be discontinued after July 31, to not interfere with wildflower germination.) The rates for the three/four-way mixes are: RoundUp ProMax® at eight ounces per acre plus Outrider® at 1.33 ounces per acre and Escort® XP at one ounce per acre and Vista® XRT at 10 ounces per acre.
Applications with Outrider® or Outrider® plus RoundUp ProMax® can be made until October 15th.

A three-way mix using Outrider®, RoundUp ProMax® and Escort® XP can be used to treat Johnsongrass, broadleaf weeds such as morningglory and field bindweed, thistles or sunflowers, and chemically mow other vegetation. In areas where bloodweed (Giant Ragweed) is present, Vista® XRT can be added to the three-way mix to treat it.

When wildflowers are present, precision, spot applications made with the Flex-5 or handgun is recommended. Overspray applications for Johnsongrass when wildflowers are present should be made only with Outrider® at 1.33 ounces per acre and 1 quart of surfactant per 100 gallons of water plus drift control. Handgun applications of Outrider® to treat Johnsongrass when wildflowers are present should be made with one ounce of Outrider® per 100 gallons of water with one quart of surfactant per 100 gallons of water.

In instances where Johnsongrass has become hard to control with Outrider®, Target® 6.6 can be used instead. However, Target® 6.6 must be made in two applications, 30-60 days apart while the Johnsongrass is actively growing. And the temperature needs to be at least 70 degrees on the application day. Target® 6.6 should be applied at a rate of 1.5 quarts per acre, plus 2 quarts surfactant per 100 gallons of water.

Also see Sections 15.1.5, 15.3.1.1, 15.3.1.2 and 15.3.2.1.

### 14.3 Giant Ragweed (Bloodweed)

Giant Ragweed (Ambrosia trifida) is an annual broadleaf weed that can obtain heights of over ten feet. The plant germinates in the spring and flowers in the fall. The flowers are small and inconspicuous. The plant is blamed for hay fever problems while it is blooming.

Normally growing in the eastern two-thirds of the State it generally prefers moist soil in and around ditch areas.

Giant Ragweed can be controlled with an application of Vista® XRT at 10 ounces per acre rate plus surfactant at the rate of 2 quarts per 100 gallons of water in late spring-early summer. Spraying mature plants will yield poor results.

In areas where Johnsongrass and Bloodweed control is necessary, Outrider® and Roundup PROMAX® can be mixed with Vista® XRT at the 10 oz/ac rate without surfactant. The Bloodweed must be actively growing with adequate soil moisture to achieve the best results. Also see Sections 15.3.1.2 and 15.8.3.

### 14.4 Musk Thistle

Musk Thistle (Carduus nutans) is a biennial plant, which can grow up to eight feet tall. Musk Thistle takes two years to mature and die. The first year the plant is a rosette. The second year the plant grows tall and blooms. The leaves are dark green, deeply lobed, hairless and have a light green midrib. A silver gray leaf margin is characteristic of
each spine tipped lobe. The leaf base extends down the stem to give the plant a winged appearance. The terminal flower is large (one to three inches in diameter), solitary and usually nodding or bent over slightly. The flowers are purple and are "powder puff" shaped producing thousands of straw-colored seeds per plant. Seed dispersal begins seven to ten days after blooming. The seeds are attached to parachute-like hairs (pappus) which allow for their dispersal by wind currents.

Thistles reproduce only by seed so it’s very important to control this plant before it goes to seed. It grows from the Panhandle to Central Texas. It can become a serious agricultural pest as well as cause safety problems for the Department.

Control of Musk Thistle can be obtained with an application of Transline® at 10 ounces per acre rate, or Vista® XRT at 10 ounces per acre. Either of these products should be applied before the plant matures (early spring / March - April).

14.5 | Sunflower

Sunflowers (Helianthus annuus) are a drought tolerant annual broadleaf weed, which may reach a height of eight to ten feet. Yellow daisy-like flowers with dark centers grow two inches across. Multi-stemmed plants grow irregularly and are common throughout the state on roadsides, but usually occur in disturbed areas.

Sunflowers are a common weed problem that quickly emerge after construction projects are over, especially when new topsoil is added to the right of way from outside sources when stockpiled topsoil is depleted.

Sunflowers can be controlled with an application of Transline® at 10 ounces per acre or with the herbicide Escort® XP at the rate of 1 ounce per acre plus surfactant at the rate of 1 quart per 100 gallons of water. Plants should be sprayed when they are 2-3 feet in height.

14.6 | Field Bindweed

Field Bindweed (Convovulus arvensis), related to Morning Glory Vine, is a long-lived perennial which produces a dense ground cover. The twining stems vary from 1.5 to 6 feet or more in length. It produces white to pink flowers, from April through September, and seeds, which may lie dormant in the soil for 30 to 40 years.

Field Bindweed occurs from the Panhandle to Central and West Texas along roadsides, railroads, fields, gardens and waste places and is a serious agricultural pest. Field Bindweed invades and becomes rapidly established in disturbed areas, often covering signs and guard rails. Minimizing soil disturbance in the right-of-way will reduce the spread of this pest plant.

The most effective herbicide to control Field Bindweed is Escort® XP applied at a rate of 1 ounce per acre during the flowering period. Always add 1 quart of surfactant per 100 gallons of water.
14.7 | Bermudagrass

Bermudagrass (*Cynodon dactylon*) is a low-growing, perennial grass, which spreads mostly by underground and above ground runners, although, common Bermudagrass produces viable seed. This plant grows primarily in loamy, seasonally moist soils; it is commonly found on highway roadsides. Although Bermudagrass is a valuable cover species, reducing erosion, it is a potential pest when it grows into the pavement. Bermudagrass often penetrates the pavement shoulder contributing to pavement breakdown.

Bermudagrass growing at the edge of pavement is generally best controlled by an early fall application of *Roundup PROMAX®* at 3 quarts plus *Esplanade® 200 SC* at 4 ounces per acre.

Bermudagrass growing in riprap and on concrete fixtures is generally best controlled with an application of *Roundup PROMAX®* at 3 quarts per acre rate and *Esplanade® 200 SC* at a rate of 4 ounces per acre.

Bermudagrass is chemically mowed with the 8 oz of *Roundup PROMAX®* in the over spray mixes.

Applications should be restricted to no more than 6 inches from the edge of the paved surface and 12 inches behind the guardrail. Applications wider than 12 inches may result in erosion and sediment loss.

14.8 | Mesquite

Mesquite (*Prosopis glandulosa*) grows either as a shrub or a tree and is abundantly armed with stiff spines. The plants usually flower in the spring. The flowers are very small and grouped together in conspicuous, yellowish bunches. Mesquite is widely distributed in the western half and southern Texas, generally in deep soils. It increases in abundance in disturbed grasslands.

Mesquite, where it occurs in areas of the right-of-way that must be maintained, may be mowed annually at the time of the fall full-width mowing. Alternatively, where the plants are large enough or the need of removal is necessary, the herbicide *Pathfinder II®* can be applied as a basal bark application or to a cut stump. Foliar applications can be performed with the herbicide *Transline®,* at 21 ounces per acre plus 2 quarts surfactant per 100 gallons of water, applied in mid-summer to early fall, or with the herbicide *Capstone®* at 6 pints per acre plus 2 quarts surfactant per 100 gallons of water, applied in summer and fall.
14.9 | Huisache

Huisache (*Acacia farnesiana*) is a brushy species, which occurs as both shrubs and trees, usually with several trunks. The branches are numerous and armed with many paired, pin-like, pale spines. The fragrant yellow flowers are clustered in small spheres. The plants flower in the spring, but many produce flowers again after rain during periods of drought.

Huisache is primarily found in South Texas, extending north to Travis County and northwest to Brewster County.

Huisache, when it occurs in areas of the right-of-way that must be maintained, may be mowed annually at the time of the fall full-width mowing. Alternatively, where the plants are large enough or the need of removal is necessary, the herbicide *Pathfinder® II* can be applied as a basal bark or cut stump application at any time of the year. Foliar application with the herbicide *Transline®*, at 21 ounces per acre plus 2 quarts surfactant per 100 gallons of water, applied in mid-summer to early fall, or with the herbicide *Capstone®* at 6 pints per acre plus 2 quarts surfactant per 100 gallons of water, applied in summer and fall.

14.10 | Retama

Retama (*Parkinsonia aculeate*) generally occurs as a small, widely branching tree with sharp, slightly curved spines on green barked branches. The flowers are yellow, and are identifiable as distinct, individual flowers (unlike Mesquite and Huisache). The plant may flower Spring through fall, depending on location and climate.

Retama is distributed throughout the South Texas region, extending northward to at least Williamson County and east to Brazos County.

Retama, where it occurs in areas of the right-of-way that must be maintained, may be mowed annually at the time of the fall full-width mowing. Alternatively, where the plants are large enough or the need of removal is necessary, the herbicide *Pathfinder® II* applied as a low volume basal application at any time of the year. Control can also be achieved with *Transline®* at 21 ounces per acre plus 2 quarts surfactant per 100 gallons of water, applied in mid-summer to early fall, or with a foliar application of the herbicide *Capstone®* at 6 pints per acre plus 2 quarts surfactant per 100 gallons of water, applied in summer and fall.
14.11 | Switchgrass

Switchgrass (*Panicum virgatum*) is a native, warm-season, perennial tall bunchgrass that grows from two to seven feet tall. Leaf blades are four to twenty-four inches long and .2 to .6 inches wide. Switchgrass flowers from August through September. Switchgrass roots can sometimes reach down ten to eleven feet deep. Very palatable by livestock.

Its large size and growing habit cause sight distance issues on the right-of-way.

Control of Switchgrass can be obtained by spot treating clumps using the herbicide **Roundup PROMAX®** in a 1.5% solution with water and applying this solution with a handgun or pump-up sprayer. Another method would be to use a **Rotowiper®** application system with a 25% **Roundup PROMAX®** solution in water. An overspray application of **Target® 6.6** may be made to treat Switchgrass. **Target® 6.6** needs to be made when temperatures are at least 70 degrees and the Switchgrass is green and actively growing. A second application, 30-60 days after the first may be needed. **Target® 6.6** should be applied at a rate of 1.5 quarts per acre plus surfactant at a rate of 2 quarts surfactant per 100 gallons of water. **DO NOT ADD Roundup PROMAX® to Target® 6.6 mixes.**

14.12 | Guinea Grass

Guinea Grass (*Panicum maximum*) is an introduced, warm-season bunchgrass from Africa. Deep, dense fibrous root system withstands drought conditions, but prefers south Texas. Guinea Grass can grow over 6 feet tall with long, narrow, fine, soft leaves.

Its large size and growing habit has caused it to become a pest on the right-of-way.

Control of Guinea Grass can be obtained by spot treating clumps using **Roundup PROMAX®** in a 1.5% solution with water and applying this solution with a handgun or pump-up sprayer. Another method is by overspraying with the Flex-5 spray head the herbicide **Roundup PROMAX®** at a rate of 16 ounces per acre solution in water.
14.13  |  Chemical Pruning

Chemical Prune woody plants and tree limbs encroaching in the clear zone on the state’s right-of-ways with the herbicide Capstone®. With the Flex-5 spray head woody plants can be controlled with Capstone® at 6 pints per acre plus surfactant at the rate of 2 quarts/100 gallons of water. Capstone® can be applied at any time during the growing season when the woody plants are actively growing with adequate foliage.

It is recommended that an early fall application of Capstone® be made before the trees defoliate. Position the Flex-5 spray head to spray no higher than the cab of the herbicide truck prior to application.

In areas where there is a lot of undergrowth around the trees that would otherwise need to be trimmed mechanically add Vista® XRT, at 10 ounces per acre to the Capstone® at 6 pints per acre plus the addition of surfactant at the rate of 2 quarts/100 gallons of water.

Note: The herbicide Capstone® at 9 pints per acre is the maximum rate per year.

14.14  |  Turnip Weed

Turnip Weed or Bastard Cabbage (Rapistrum rugosum) is an annual, many-branched, herbaceous plant that grows from one to five feet or more in height and has a taproot that can become quite large. Leaves are deep green, lobed and wrinkled, and sometimes have a reddish cast. The terminal lobe is larger than the lateral lobes, especially on the basal leaves. Younger leaves growing higher up on the plant are less lobed and more elongated. Turnip Weed typically flowers from early spring into summer, bearing clusters of small, showy yellow flowers at the tips of its branches, resembling those of broccoli and cabbage. Turnip Weed can be identified more easily and certainly by its unusually shaped fruit - a two-segmented seed capsule, called a siliqua. The seed capsule is stalked, with a long beak at the tip, and contains one to two seeds. The seeds are tiny, oval-shaped, dark brown and smooth.

Turnip Weed is one of the first plants to emerge in the spring and since it is faster growing than most spring wildflowers it grows alongside competing for moisture, nutrients and sunshine causing problems on the roadside where it exists.

Turnip Weed can be controlled by using the herbicide Escort® XP at a rate of 2 ounce per acre rate in the fall. Always add 1 quart of surfactant per 100 gallons of water.
14.15 | Morning Glory Vine

Morning Glory Vine (*Ipomoea purpurea*), related to Field Bindweed (*Convolvulus arvensis*) and Sweet Potato, forms twining vines with bell-shaped flowers, and its varieties have also become intertwined botanically under the name “morning glory.” The name comes from the flowers, which last a single day. Flowers are white, blue, pink, purple, red, and multicolored.

The vines grow quickly to ten feet or more only two months after seeds sprout. The leaves are heart-shaped, and the flowers are normally open from dawn to midmorning, then they close.

Morning Glory Vine has become a pest plant on the right-of-way, twining up into signs, delineators, bridge structures, guard rails, barrier fences and landscaped shrubbery.

The most effective way to control Morning Glory Vine is with the herbicide *Escort® XP* applied at a rate of 1 ounce per acre during the flowering period. Always add 1 quart of surfactant per 100 gallons of water. Morning Glory Vine in cable barriers can be controlled with *Escort® XP* applied at a rate of 2 ounce per acre during the flowering period. Always add 1 quart of surfactant per 100 gallons of water.

14.16 | Western Bitterweed

Western Bitterweed (*Hymenoxys odorata*) is an erect, annual, composite plant growing from three inches to two feet tall. Stems are purplish near the base. Leaves are alternate and usually woolly underneath. Bright yellow flowers bloom from April through June and occasionally in the fall. This plant has a bitter taste and a distinct odor. Western Bitterweed is toxic to sheep and is generally unpalatable.

Western Bitterweed is located throughout the western portion of the State in various counties and is concentrated in the Trans-Pecos region of Texas.

Western Bitterweed readily invades disturbed areas, but seems to be largely excluded from areas where native vegetation persists. Curtailing disturbances in the right-of-way will likely restrict the spread of this pest species.

Western Bitterweed can be controlled by using the herbicide *Escort® XP* at the 1 ounce per acre rate plus 1 quart of surfactant per 100 gallons of water. Control of Western Bitterweed can be accomplished by overspray application or by spot spraying small concentrations of Western Bitterweed with the handgun sprayer.
**14.17 | African Rue**

African Rue (*Peganum harmala*) is a perennial plant with a rounded tuft of fleshy stems from a twisting, woody root. The flowers are white to pale yellow appearing from April through November. Each flower produces a small marble-sized capsule, which is filled with seeds.

African Rue reportedly occurs in Edwards and Garza counties though it is most abundant in the Trans-Pecos region of Texas. This plant is reportedly poisonous to livestock.

African Rue is extremely aggressive and readily invades disturbed areas, but seems to be largely excluded from areas where native vegetation persists. Curtailing disturbances in the right-of-way will likely restrict the spread of this pest species.

Currently, the most effective means of controlling African Rue is with an application of the herbicide *Escort® XP* at a rate of 3 ounces per acre while the plant is flowering. Always add 1 quart of surfactant per 100 gallons of water.

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**14.18 | Cattails**

Cattails (*Typha latifolia*) are perennial aquatic plants, which may grow to ten feet tall from the creeping root to the tip of the flowering stem. The flowers are extremely small and are clustered together in a cylindrical, brown tuft. The flowers usually develop from March through May.

Cattails are scattered throughout Texas in roadside wetlands, drainage areas, marshes, streams and other shallow water areas impeding drainage.

Cattails and other associated aquatic vegetation are controlled with an *Approved Aquatic Glyphosate* at 8-quarts/100 gallons of water solution using a handgun. Always add 2 quarts of surfactant to each 100 gallons of water.
14.19 | Kudzu

Introduced from Japan, Kudzu (*Pueraria lobata*) is an aggressive perennial, trailing and climbing vine member of the legume family. A dense stand of identically colored plants growing on and around everything in its path is a familiar field mark.

Rarely flowering, Kudzu stems and roots spread out in all directions from starchy fibrous root crowns, with new plants beginning at stem nodes every one to two feet. This dense packing of Kudzu can result in tens of thousands of plants occupying a single acre of land. Leaves are dark green and hairy beneath, often tri-lobed, and in groups of three on the vine. The ½ to ¾ inch elongated purple flowers with a fragrance reminiscent of grapes are pea-like in shape and are produced on plants exposed to direct sunlight. Kudzu fruits, present in October and November, are hairy, bean-like pods which produce only a few viable seeds in each pod cluster. It is thought that some seeds can remain dormant for several years before they germinate.

During peak growing season in early summer, this prolific vine can grow at a rate of a foot a day, easily covering and choking trees and under story vegetation.

Kudzu populations consists of small pockets in the far eastern counties of the State with one infestation being eradicated by the Colorado River in south Austin.

Kudzu is controlled with Transline® herbicide at 21 ounces per 100 gallons of water solution using a handgun. Always add 2 quarts of surfactant to each 100 gallons of water.

14.20 | Other Right of Way Pests

Applications of all pesticides for the control of right-of-way pests including, but not limited to, burrowing rodents, fire ants, other destructive insects, etc. must be made in a manner consistent with all current and pertinent laws and regulations as established by the Texas Department of Agriculture and the Structural Pest Control Service. All label directions must be followed completely.

Contact the Maintenance Field Support Section Staff of the Maintenance Division for specific recommendations.
SECTION 15

15.0 | APPROVED CHEMICALS FOR RIGHT-OF-WAY VEGETATION MANAGEMENT

15.1 | General Characteristics of Roundup PROMAX® (Replaced Roundup® Pro)

Roundup PROMAX® is a herbicide which may be used effectively in many applications within TxDOT’s maintenance activities. These applications include pavement edge treatments to prevent the destruction of pavement, treatments around signs, delineators and guardrails, chemically mowing grasses, and controlling Johnsongrass. Packed in 2.5 gallon jugs, 2 per case, 1 Unit.

Roundup PROMAX® is a non-selective, foliar-applied, post-emergence herbicide which provides broad-spectrum control of many grasses and broadleaf plant species. Consequently, it is important to avoid application of this chemical onto the green portion of any desirable plant. The chemical is absorbed through the green leaf surface and then translocated into the root system.

The best time to apply Roundup PROMAX® is when the plant species is green and actively growing. This will ensure maximum movement of the chemical into the root system.

15.1.1 | Effects of Roundup PROMAX® Application during Dry Weather

High temperatures, prolonged periods of dry weather, and lack of soil moisture tend to force many plant species (e.g. Johnsongrass) into a state of semi-dormancy. When these conditions exist, plant growth slows in order to conserve available moisture and food reserves. With reduced energy production, movement of food within the plant is also reduced and very little food is moved into the plant’s root system. Since Roundup PROMAX® acts directly upon the plant’s root system, the application of the chemical during these conditions will yield poor results. In addition to the plant not being able to absorb the herbicide due to the dry weather, the surfactant in Roundup PROMAX® can burn the plant. And although the plant appears to be dying, it is only burnt.

Mature plants are usually identified by a seed head or flower. Because older plant tissues thicken with maturity, herbicides are not as easily adsorbed causing Roundup PROMAX to not be as effective.
15.1.2 | Effects of Roundup PROMAX® Applications

Applications of Roundup PROMAX® should generally be discontinued after the first killing frost. After this initial killing frost, warm-season plant species such as Johnsongrass become dormant for the winter and their leaves turn yellow or brown. Any application of chemical during this period will yield poor results since there is little or no movement of food from the foliage into the root system.

Do not apply Roundup PROMAX® if rainfall is imminent. Rainfall within 30 minutes after application will wash the chemical from the leaves and reduce the effectiveness of the application.

Roundup PROMAX® does not volatilize (form a gas or vapor) to drift onto non-target areas, allowing the chemical to be safely utilized within urban areas. However, care must be taken to prevent spray or drift onto the foliage of desirable plants. Drift normally occurs when the spray pressure is too high for the nozzle tips being used, or when spraying in windy conditions. Do not apply Roundup PROMAX® at higher than recommended spraying pressure or during windy conditions. Always use the correct nozzle tips (See Section 5), and always use the appropriate drift control agent (See Section 7).

Do not spray the bark of young trees when the bark is green. Roundup PROMAX® may enter the tree through the green bark and cause injury to the plant’s root system. On older trees where the bark is no longer green, Roundup PROMAX® may be applied to the tree base without risk of injury.

Always mix Roundup PROMAX® with clean water. Canal, creek and pond water may contain soil particles that can reduce the effectiveness of the chemical and can damage spray equipment. Hard water may also reduce the effectiveness of Roundup PROMAX®.

Do not mix Roundup PROMAX® in galvanized containers. The chemical reacts with Zinc, forming a hydrogen gas, which may explode. Always use fiberglass or stainless steel backpack or hand-held sprayers. There is no danger when using the herbicide in the TxDOT herbicide spray units. Add Roundup PROMAX® as the last herbicide in a mix.

15.1.3 | Application Procedures for Roundup PROMAX® - Fall Application

- Johnsongrass should be actively growing and have adequate leaf area before application;
- Correct nozzle tips (See Section 5) must be used;
- Mix Roundup PROMAX® in water according to the quantities the spray unit actually dispenses (See Calibration Formula, Section 8);
- When using the herbicide spray unit, vehicle speed should be maintained at the speed used in the calibration procedure, and the proper spraying pressure must be maintained (See Section 8);
- Apply the spray uniformly to the foliage of the plant. Nozzles are spaced to cover plant foliage evenly. Plant foliage should appear wet and glistening after application; and
- Delay mowing the treated area until 10-14 days after application. This will permit adequate movement of the chemical into the root zone.

15.1.4 | Use of Roundup PROMAX® for Johnsongrass Control (Bermuda Release)

The Bermuda release program seeks to reduce infestation of Johnsongrass and to encourage the growth of desirable grasses including Bermuda grass.

To effectively control Johnsongrass, Outrider® and Roundup PROMAX® must be applied uniformly to the leaves of the plant. Roundup PROMAX® has no soil activity or residual, therefore direct foliar application is required for control.
In the spring, most of the growth activity is directed upwards away from the root zone. Food energy, stored in the roots during the previous fall, is being moved upward to produce new foliage and seed.

The plant will then move the chemical downward into the root system along with the food energy the plant is producing, thereby destroying the root system and the plant.

If Roundup PROMAX® is applied in the spring of the year, the results achieved will not be as successful as applications made during the late summer or early fall with the combination above. Johnsongrass should be controlled when it is actively growing and there is adequate leaf area to spray before it gets exceedingly tall.

**The ideal time to apply Roundup PROMAX® is when the plant is actively growing and is manufacturing food for storage in the plant’s root system. Do NOT mix Roundup PROMAX® to Outrider® to treat Johnsongrass when wildflowers are present.**

### 15.1.5 | Roundup PROMAX® for Chemical Mowing Around Desirable Trees and Shrubs

Roundup PROMAX® is not active in the soil and cannot be absorbed by the root system of desirable plants. Accordingly, the chemical may be applied to the foliage of weeds and unwanted grasses located underneath desirable trees and shrubs without harm to the desirable plant. This procedure may have benefit in landscaped areas and within picnic areas.

### 15.1.6 | Roundup PROMAX® for Control of Switchgrass

Control of Switchgrass can be obtained by spot treating clumps using the herbicide Roundup PROMAX® in a 1.5% solution with water applying this solution with a handgun or pump-up sprayer.

Another method would be to use a Rotowiper® application system with a 25-33% Roundup PROMAX® solution in water.

It is recommended that a program for control of Wildoats and Jointed Goatgrass be undertaken only where the adjacent landowner has expressed a need for control, and is trying to control the species within his crops as well.

### 15.1.7 | Roundup PROMAX® for Complete Control in Riprap, Raised Medians, Paved Medians and Retaining Walls

The recommended application rate for vegetation growing on Riprap, Paved Medians, Raised Medians and Retaining Walls is 3 quarts of Roundup PROMAX® per acre rate using the overspray method or a 1.5% solution of Roundup PROMAX® using the Handgun method.
15.2 General Characteristics of EsplAnade® 200 SC

EsplAnade® 200 SC herbicide is a residual, broad-spectrum bareground herbicide for control of broadleaf weeds, sedges and grasses. EsplAnade® 200 SC’s active ingredient is Indaziflam. Applying EsplAnade® 200 SC in the spring controls spring and summer germinating weeds while a fall application will control winter weeds. EsplAnade 200 SC is used for it’s soil residual properties to control vegetation for extended periods of time.

EsplAnade® 200 SC is formulated as white, liquid suspension. Shake the EsplAnade® 200 SC container well before using. Vigorous agitation is REQUIRED when mixing EsplAnade® 200 SC. Therefore EsplAnade® 200 SC must be used only within equipment which provides proper agitation.

Applications to the edge of pavement will be restricted to no more than 6 inches from the edge of the paved surface and 12 inches behind the guardrail. Applications wider than 12 inches may result in erosion and sediment loss.

The recommended application rate for vegetation growing at the edge of pavement is 3 quarts of Roundup PROMAX® plus EsplAnade® 200 SC at 4 ounces per acre rate to control vegetation in Edge of Pavement.

To allow for soil adsorption of EsplAnade® 200 SC, it is best to make applications when there is no rain forecasted within 48 hours of the application. If rainfall is NOT forecasted within 48 hours of the application, a handgun application of 6 quarts of Roundup PROMAX® plus Esplanade® 200 SC at 4 ounces per 100 gallons of water may be made to concrete structures and riprap.

EsplAnade® 200 SC is NEVER used by itself in TxDOT’s herbicide spray program. This product is ALWAYS used in combination with Roundup PROMAX® to be applied on edge of pavement.

The following precautions should always be observed when using EsplAnade® 200 SC:

<table>
<thead>
<tr>
<th>PRECAUTION</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ensure proper agitation.</td>
<td>To prevent chemical from settling out of suspension.</td>
</tr>
<tr>
<td>Leave buffer zone between agricultural crops, especially sorghum species.</td>
<td>Helps catch any spray drift and helps “tie-up” EsplAnade® 200 SC, which may otherwise move laterally from treated area.</td>
</tr>
<tr>
<td>Avoid treating edges adjacent to fields in which rows run perpendicular to the highway.</td>
<td>If lateral movement of EsplAnade® 200 SC was to occur, rows that run perpendicular to the highway are more likely to be affected.</td>
</tr>
<tr>
<td>Do not spray desirable vegetation.</td>
<td>EsplAnade® 200 SC can inhibit the emergence of seed and damage newly emerged seedlings.</td>
</tr>
</tbody>
</table>
15.3 | **General Characteristics of Outrider®**

Outrider® is a foliar applied herbicide with short soil residual half-life activity. Outrider® is used to control Johnsongrass. The half-life (the time required for one-half of the chemical to lose its effectiveness) is approximately 16-32 days. Outrider® is formulated as a dispersible granule that eliminates most of the excessive dust created when mixing conventional powders.

As a dry herbicide, Outrider should be added before liquid herbicides. Outrider should be agitated and completely dissolved before adding any liquid herbicides or surfactants.

Vigorous agitation is REQUIRED when mixing Outrider®. Therefore Outrider® must be used only within equipment which provides proper agitation.

The following precautions should always be observed when using Outrider®:

<table>
<thead>
<tr>
<th>PRECAUTION</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ensure proper agitation.</td>
<td>To prevent chemical from settling in tank.</td>
</tr>
<tr>
<td>Leave a buffer zone between agricultural crops, especially sorghum species.</td>
<td>Helps catch any spray drift and helps “tie-up” Outrider® in the soil, which may otherwise move laterally from treated area.</td>
</tr>
<tr>
<td>Avoid treating close to fields in which rows run perpendicular to the highway.</td>
<td>If lateral movement of Outrider® was to occur, rows that run perpendicular to the highway are more likely to be affected.</td>
</tr>
<tr>
<td>Do not spray desirable vegetation.</td>
<td></td>
</tr>
</tbody>
</table>

15.3.1 | **Overspray Operations**

15.3.1.1 | **Use of Roundup PROMAX® + Outrider® Combined for Johnsongrass Control**

The Roundup PROMAX® + Outrider® combination is recommended for Johnsongrass control for the southern and eastern part of Texas where Bahiagrass is the predominant grass species on the right-of-way. This combination is also recommended for Johnsongrass control when applications are made after July 31st in all areas due to wildflowers.

However, applications of Roundup PROMAX® + Outrider® should be discontinued October 15th because it could cause wildflower damage.

The recommended herbicides to control Johnsongrass, broadleaf weeds and Bahiagrass that are in ROW’s are Roundup PROMAX® + Outrider® + Vista® XRT. Application rates are Roundup PROMAX® at 8 ounces plus Outrider® at 1.33 ounces plus Vista® XRT at 10 ounces per acre.
15.3.1.2 | Use of Roundup PROMAX® + Escort® XP + Outrider® for Johnsongrass

A combination of Roundup PROMAX® + Escort® XP + Outrider® in an overspray application is typically used for the control of Johnsongrass and broadleaf weed species in the central and western parts of Texas. Precautions should be taken in those areas that have prolific wildflowers.

Overspray operations should begin in the spring after Bermudagrass has broken its winter-dormancy and is actively growing, and after wildflowers have produced mature seed. Usage of the Roundup PROMAX® + Escort® XP + Outrider® should be DISCONTINUED BY JULY 31st. Applications made after this date, have the potential to damage fall germinating wildflowers.

The recommended herbicides to control Johnsongrass and broadleaf weeds, especially bloodweed, ragweed and sunflower are Roundup PROMAX® + Escort® XP + Outrider® + Vista® XRT. Application rates are Roundup PROMAX® at 8 ounces plus Escort® XP at 1 ounce plus Outrider® at 1.33 ounces plus Vista® XRT at 10 ounces per acre.

15.4 | General Characteristics of Target® 6.6

Target® 6.6 is a foliar applied, post-emergent selective herbicide used to control hard-to-kill Johnsongrass. The active ingredient in Target® 6.6 is MSMA. Target® 6.6 is formulated as an amber-colored liquid. It is important to apply Target® 6.6 when the temperature is at least 70 degrees. It takes two applications, 30-60 days apart on growing Johnsongrass for an effective application to occur. **DO NOT MAKE MORE THAN 2 APPLICATIONS OF Target® 6.6 PER YEAR PER ACRE.**

Always agitate the tank mixture when mixing Target® 6.6. Therefore Target® 6.6 must be used...
only within equipment which provides proper agitation. Once Target® 6.6 is mixed, the entire batch should be sprayed and not left in solution. The recommended use rate for Target® 6.6 is 1.5 quarts per Acre plus 2 quarts of surfactant per 100 gallons of water.

The following precautions should always be observed when using Target® 6.6:

<table>
<thead>
<tr>
<th>PRECAUTION</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ensure proper agitation.</td>
<td>To prevent chemical from settling out of solution.</td>
</tr>
<tr>
<td>Leave a buffer zone between agricultural crops, especially sorghum and corn species.</td>
<td>Helps catch any spray drift.</td>
</tr>
<tr>
<td>Do not spray desirable vegetation.</td>
<td>Do not spray St. Augustine or Bluestem grasses species.</td>
</tr>
</tbody>
</table>

15.5 | Approved Aquatic Glyphosate Herbicides

There is a need for controlling unwanted aquatic vegetation in ditches, drainage areas near creeks and rivers and irrigated farmlands to ensure proper drainage. The use of herbicides in these areas has been limited by the possible pollution of the water and the possibility of the herbicide moving off target. All Approved Aquatic Herbicides will be compatible with the Department’s desire to be environmentally sensitive and to maintain proper drainage on and through the highway system.

15.6.1 | General Characteristics of Approved Aquatic Herbicide

The three Approved Aquatic Glyphosate Herbicides stocked in the warehouses will contain the active ingredient Glyphosate, at 54% concentration, the same active ingredient that is found in Roundup PROMAX®, but at a higher concentration. There is no surfactant found in the Approved Aquatic Herbicide, so a surfactant approved for aquatic applications must be added. All Approved Aquatic Herbicides will be labeled for use in all bodies of fresh water and in all types...
of aquatic sites which may contain flowing and non-flowing water. All of the Approved Aquatic Herbicides will effectively control a wide variety of emerged (above water) aquatic weeds, and it exhibits the same toxicological and environmental benefits found in Roundup PROMAX®.

**15.6.2 | Application Procedures for Approved Aquatic Herbicide**

Applications of Approved Aquatic Herbicide can be done with all types of spray equipment, but a handgun application may be the most desirable since many areas are inaccessible to our spray units. When applying Approved Aquatic Herbicide with a handgun mix a rate of 8 quarts of Approved Aquatic Herbicide in 100 gallons of water. Application should be made on a “spray-to-wet” basis for uniform and complete coverage.

Although Approved Aquatic Herbicides are primarily for use in aquatic areas such as creeks and drainage ditches, it may happen that some Approved Aquatic Herbicide mixture may be left over after completing the spraying of the aquatic weeds. In this case the leftover Approved Aquatic Herbicide mixture may be used for terrestrial (i.e. dry land) weed control in the right-of-way. This concentration of Approved Aquatic Herbicide will provide complete vegetation control.

**15.6.3 | Application Timing for Approved Aquatic Herbicide**

Proper timing is important to achieve the best results. Approved Aquatic Herbicide is like Roundup PROMAX® in that it is most effective when applied late in the growing season to actively growing vegetation. Cattails should be sprayed when most plants are flowering, and willows should be sprayed when the plant has mature foliage in late summer or fall. The optimum treatment period for Georgia Cane or Giant Reed is from September through October.

**15.7 | General Characteristics of Escort® XP**

Escort® XP is a foliar herbicide that has a relatively short soil residual half-life. Escort XP is used to control broad leaf weeds. The residual effects of Escort® XP generally last for 3-4 weeks depending on soil type, rainfall, and temperature. Escort® XP is used for selective broadleaf control in the right-of-way. Escort® XP will affect Bahiagrass but will not damage other native grasses. Escort® XP is formulated as an extruded pellet (small, cylindrical granules) which eliminates most of the excessive dust created when mixing conventional powders.

Vigorous agitation is required when mixing Escort® XP. Therefore, Escort® XP must be used only within equipment that provides proper agitation. Because Escort XP is a drive herbicide, it should be added and allowed to completely dissolve before adding any liquid herbicides or surfactants.
Follow these precautions when using the herbicide **Escort® XP**:

<table>
<thead>
<tr>
<th>PRECAUTION</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ensure proper agitation</td>
<td>Necessary to prevent chemical from settling in tank</td>
</tr>
<tr>
<td>Leave buffer zone between agricultural crops.</td>
<td>Helps catch any spray drift and helps “tie-up” Escort® XP, which may otherwise move laterally from treated area.</td>
</tr>
<tr>
<td>Avoid treating adjacent to fields in which rows run perpendicular to the highway.</td>
<td>If lateral movement of Escort® XP was to occur, rows that run perpendicular to the highway, are more likely to be affected.</td>
</tr>
<tr>
<td>Do not spray desirable vegetation.</td>
<td>Fruit trees are particularly susceptible to Escort® XP.</td>
</tr>
</tbody>
</table>

**Always read and follow label instructions for proper application and to determine plants which are susceptible to Escort® XP.**

### 15.7.1 | Application Procedures with Escort® XP

Application of **Escort® XP** can be made with all of the overspray equipment now being used by the Texas Department of Transportation (TxDOT). Applications using only **Escort® XP** will need surfactant added to the mixture. Without the addition of a surfactant, results will be tremendously reduced.

Apply **Escort® XP** using the following table:

<table>
<thead>
<tr>
<th>SPECIES OF PLANTS</th>
<th>RATE</th>
<th>TIME OF YEAR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field Bindweed</td>
<td>1 ounce per acre</td>
<td>June - September</td>
</tr>
<tr>
<td>Common Sunflower</td>
<td>1 ounce per acre</td>
<td>Spray when 2-3 feet in height.</td>
</tr>
<tr>
<td>Western Bitterweed</td>
<td>1 ounce per acre</td>
<td>March - April</td>
</tr>
<tr>
<td>Turnip Weed</td>
<td>1 ounce per acre</td>
<td>very early Spring</td>
</tr>
<tr>
<td>Morning Glory Vine</td>
<td>1 ounce per acre</td>
<td>June - September</td>
</tr>
<tr>
<td></td>
<td>2 ounces per acre</td>
<td>June –September, in Cable Fence</td>
</tr>
<tr>
<td>African Rue</td>
<td>3 ounces per acre</td>
<td>September</td>
</tr>
<tr>
<td>Other Broadleaf Weeds</td>
<td>1 ounces per acre</td>
<td>May - July 31st</td>
</tr>
<tr>
<td>Bastard Cabbage</td>
<td>2 ounces per acre + 1 quart of MSO</td>
<td>After Fall mowing - Feb.</td>
</tr>
</tbody>
</table>
15.7.2 | Use of Escort® XP with combination of Roundup PROMAX® + Outrider® for Johnsongrass and Broadleaf Weed Control

Escort® XP will be used in conjunction with Roundup PROMAX® + Outrider® in an overspray application used primarily for the control of Johnsongrass and broadleaf weed species. In the central and western parts of Texas precautions should be taken in those areas that have prolific wildflowers. Escort® XP only affects Bahiagrass and will not damage other native grasses. Overspray operations should begin in the spring after Bermudagrass has broken its winter-dormancy and is actively growing, and after wildflowers have produced mature seed. Usage of the Roundup PROMAX® + Escort® XP + Outrider® should be DISCONTINUED BY JULY 31st. Applications made after this date have the potential to damage fall germinating wildflowers.

15.8 | General Characteristics of Transline®

Transline® is an herbicide used effectively to kill certain broadleaf vegetation in the right of way. Transline® is a selective, post-emergent herbicide that controls certain broadleaf weeds and does not have any affect on grasses. Transline® has a short soil residual half-life of approximately 23 days. It is non-volatile and relatively low in toxicity to animals. However, care must be taken to prevent the drift of spray particles and to prevent accidental foliar application to desirable plants.

15.8.1 | Application Procedures for Transline® on Thistles

Thistles are biennial weeds which can cause serious safety and agricultural problems. They range throughout central Texas into the panhandle. Control of Thistles can be easily accomplished by using Transline® at the proper time. An application of Transline® at 10 ounces per acre applied in early spring will provide effective control Thistles. The Thistle should be actively growing and the application should be made prior to seed set on the plants.

15.8.2 | Application Procedures for Transline® on Common Sunflower

Common Sunflowers are annual broadleaf weeds, which may reach a height of 8-10 feet. Sunflowers are common throughout the state, but usually occur in disturbed areas and cause a serious safety and drainage problem in the southern half of the state.

Sunflowers may be controlled with an application of Transline® at 10 ounces per acre, applied in late spring through early summer. Plants should be sprayed when they are 1-3 feet in height.

**DO NOT SPRAY MATURE PLANTS.** This will yield poor results.
15.8.3 | **Application Procedures for Transline® on Mesquite**

Mesquite grows either as a shrub or a tree and is abundantly armed with stiff spines. The plants usually flower in the spring, but sometimes later. The flowers are very small and grouped together in conspicuous yellowish bunches. Mesquite is widely distributed in the western and southern parts of Texas, generally in deep soils. It increases in abundance in disturbed grasslands. Mesquite, where it occurs in areas of the right of way that must be maintained, may be mowed annually at the time of the fall full-width mowing. Alternatively, where the plants are large enough or removal is necessary a foliar application with the herbicide Transline®, at 21 ounces per acre plus surfactant at the rate of 2 quarts per 100 gallons of water, applied in mid-summer through early fall, can be made.

15.8.4 | **Application Procedures for Transline® on Huisache**

Huisache is a brushy species, which occurs as both shrubs and trees, usually with several trunks. The branches are numerous and armed with many paired, pin-like, pale spines. The fragrant yellow flowers are clustered in small spheres. The plants flower in the spring, but many produce flowers again after rain during periods of drought. Huisache is primarily found in South Texas, extending north to Travis County and northwest to Brewster County.

Huisache can be controlled with a foliar application of the herbicide Transline®, at 21 ounces per acre plus surfactant at the rate of 2 quarts per 100 gallons of water, applied in mid-summer through early fall.

15.8.5 | **Application Procedures for Transline® on Retama**

Retama is widely branching small tree with sharp, slightly curved spines on green barked branches. The flowers are yellow, and are identifiable as distinct, individual flowers. The plant may flower Spring through fall, depending on location and climate. Retama can be controlled with a foliar application of the herbicide Transline® at 21 ounces per acre plus surfactant, at the rate of 2 quarts per 100 gallons, applied in mid-summer to early fall.

15.8.6 | **Application Procedures for Transline® on Kudzu**

Kudzu is a perennial, trailing or climbing vine of the legume family with a very aggressive behavior. Dark green leaves and rarely blooming purple elongated flowers that have a fragrance reminiscent of grapes. Kudzu is nicknamed “The Vine that Ate the South” for its aggressive covering and choking out of small trees and under story vegetation.

Range consists of small pockets in the eastern part of Texas with one infestation being eradicated by the Colorado River in south Austin.

Kudzu can be controlled with the herbicide Transline®, at 21 ounces per acre plus surfactant at the rate of 2 quarts per 100 gallons of water, applied during the growing season. One foliar application will not eradicate this aggressive vine and retreatments of Transline® along with Basal Bark and cut stump treatments will need to be scheduled into an ongoing program to eliminate this plant. Seed are viable for several years after dropping and pose a threat downstream of re-infestation of this noxious weed.

Note: 21 ounces per acre of the herbicide Transline® is the maximum rate per spraying season.
15.8.7 | Low Volume Foliar Spray for Transline® on Mesquite and Huisache

Mesquite and Huisache are brushy species and a full description is stated above.

Low volume foliar spray can be accomplished using a X6 tip on a 25-gallon Poly Tank sprayer with 12-volt electric pump. Mesquite and Huisache can be controlled with the herbicide Transline®, at a rate of 21 ounces per 100 gallons of water plus surfactant at the rate of 2 quarts per 100 gallons of water, applied in mid-summer through fall.

Do not exceed 21 oz/acre labeled rate of Transline® per spraying season.

A four-wheel utility vehicle can be rigged to carry two 25-gallon tanks in the back to do a low-volume foliar application. Applicators don’t have to leave the vehicle to make these applications in most situations.

15.8.8 | Effects of Transline® Applications During Dry Weather

High temperatures, prolonged periods of dry weather and lack of soil moisture tend to force plants into a semi-dormant state. When these conditions exist, plants tend to slow down their growth in order to conserve moisture and energy.

With this conservation of moisture and energy, the plant will not absorb an adequate amount of the herbicide and all spraying should cease at this time.

15.8.9 | Precautions using Transline®

Do not make Transline® applications if rainfall is imminent. Transline® becomes rainfast in 1-2 hours.

Transline® does not volatilize (i.e. does not form a gas). It can be used safely in all areas except aquatic areas. However, care must be taken to prevent drift onto the foliage of desirable plants. Drift usually occurs when the operating pressure is too high for the nozzle tips being used, or when spraying in windy conditions. To aid in drift control always use the appropriate drift control agent (see Section 7).

| Care must be taken while spraying Transline® in wildflower areas. |

15.9 | General Characteristics of Vastlan® (Approved Aquatic Triclopyr)

Vastlan® is a foliar herbicide used for brush and broadleaf species in the rights-of-way. It can be used to control woody plants such as Mesquite, Huisache and American Locust. It can be applied to standing water. Vastlan® is approved for Aquatic chemical pruning/side trimming applications.
15.9.1 | Application Methods for Vastlan®

Vastlan® can be used for side-trimming brush applications using the flex-five head. The rate for side trimming is 1 gallon per acre with 2 quarts of surfactant per 100 gallons of water. Always add the appropriate amount of drift control to every overspray tank mix. It can also be applied via handgun applications for spot spraying brush species at 1 gallon of Vastlan® per 100 gallons of water with 2 quarts of surfactant per 100 gallons of water. Do NOT add Vista® XRT to Vastlan® mixes.

15.10 | General Characteristics of Pathfinder® II

For many years there has been a need for controlling brush in the right-of-way. The brush on the right-of-way has proven to be difficult to control due to the continuous mowing and removing the tops of the brush species while still allowing root systems to grow. Many herbicides have proven to be ineffective on this mowed brush. Pathfinder® II has proven to be very effective on this type of brush.

Pathfinder® II is a ready-to-use (RTU) herbicide mixture, active ingredient Triclopyr. It has a vegetable oil carrier that reduces environmental hazards by penetrating the brush species bark while carrying the active ingredient with it.

15.10.1 | Application Procedures for Pathfinder® II

Applications of Pathfinder® II are limited to basal bark treatments from either backpack sprayers or small electric spray units. The basal bark treatment is a low volume treatment and the correct nozzle on the handgun is essential. The spray nozzle should be Spray Systems Cone Jet Adjustable #5500-X2. This allows the correct amount of herbicide to be dispensed. All backpacks and spray units should have Viton® (fluorine rubber) gaskets to prevent leakage.

When applying Pathfinder® II the lower 12-15 inches of the bark should be sprayed. Complete coverage around the bark is essential for complete control of the brush species. Bark should be wet, but not to the point of runoff.

Complete coverage of the bark is necessary. If coverage is not achieved resprouting will occur.

Using the wrong nozzle tip with Pathfinder II® will result in cost/acre increasing dramatically.
15.11 | General Characteristics of Vista® XRT

Vista® XRT is a selective post-emergent product for control of annual and perennial broadleaf weeds. A dark brown liquid, non-volatile and rainfast in one hour after application. Vista® XRT is highly effective for the post-emergent control of Giant Ragweed (Bloodweed), Kochia, the tolerant biotypes of Kochia and Russian Thistle. Broadcast applications of Vista® XRT in the ROW should be discontinued after July 31st.

15.11.1 | Precautions using Vista® XRT

Kochia and Russian Thistles are annual weeds that can cause serious safety and agricultural problems. They range throughout the western region of Texas.

Control of Kochia can be easily accomplished by using Vista® XRT at the proper time. An application of Vista® XRT at 10 ounces per acre applied in late spring through summer will provide effective control. Kochia should be actively growing and the application should be made prior to seed set on the plant. Vista® XRT can be applied with either the handgun or overspray application method.

Control of Russian Thistle can be easily accomplished by using Vista® XRT and Escort® XP at the proper time. An application of Vista® XRT at 10 ounces per acre and Escort® XP at 1 oz per acre applied in late spring through summer will provide effective control. Russian Thistle should be actively growing and the application should be made prior to seed set on the plant. Application can be made with either the handgun or overspray application method.

Do not apply more than 23 ounces per acre of Vista® XRT annually.

15.11.2 | Application Procedures for Vista® XRT on Giant Ragweed (Bloodweed)

Giant Ragweed (Bloodweed) is an annual weed, which can cause serious safety and drainage problems in the state. It can obtain heights up to 15 feet tall.

Vista® XRT can be utilized as a lower costing alternative to Transline® for controlling Giant Ragweed (Bloodweed) when applied in late spring and early summer. Apply Vista® XRT at 10 ounces per acre plus the addition of an approved surfactant at the rate of 2 quarts per 100 gallons of water in a broadcast application or 10 ounces of Vista® XRT plus 2 quarts of surfactant per 100 gallons of water.

Applications to mature plants usually result in poor control.
15.12 | General Characteristics of Capstone®

Capstone® is used to chemically prune woody plants and tree limbs encroaching in the clear zone on the state’s right-of-ways.

Using the Flex-5 spray head, woody plants can be controlled with the herbicide Capstone® at 6 pints per acre plus surfactant at the rate of 2 quarts per 100 gallons. Capstone® can be applied at any time during the growing season when the woody plants are GREEN and actively growing with adequate foliage. DO NOT spray if leaves are changing colors or have already changed colors for winter dormancy.

The addition of 10 ounces per acre of Vista® XRT can be added to 6 pints per acre of Capstone® for the control of Hackberries and strong underbrush plus surfactant at the rate of 2 quarts per 100 gallons.

DO NOT make applications of Capstone® to aquatic locations.

Note: The herbicide Capstone® at 9 pints per acre is the maximum rate per year.

Contact the Maintenance Field Support Section Staff of the Maintenance Division for specific recommendations.

Chemical Pruning in Comanche County using Capstone®.

Chemical Pruning/Side-Trimming MUST be done BEFORE trees defoliate. It is recommended to make applications of Capstone® in the Fall to minimize complaints from the traveling public. HOWEVER, if tree leaves are changing colors or have already changed colors, DO NOT use Capstone® to chemical prune/side-trim.
15.13 | Chemical Product Specifications

Chemicals with Asterisks(*) have proprietary justification.

<table>
<thead>
<tr>
<th>Product Name or Function</th>
<th>Active Ingredient Requirement</th>
<th>Product Size and Ordering Requirement</th>
<th>Product Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Escort® XP*</td>
<td>Active Ingredient: 60% Metsulfuron Methyl</td>
<td>UOM: Container 4 Pound Container</td>
<td>Post emergent herbicide, selective for many grasses, formulated as a dry herbicide, extruded pellets.</td>
</tr>
<tr>
<td>Transline®*</td>
<td>Active Ingredient: 40.9% Clopyralid</td>
<td>UOM: Container 2.5 Gallon Container</td>
<td>Post emergent herbicide, selective for many broadleaf weeds. Formulated as a liquid solution.</td>
</tr>
<tr>
<td>Pathfinder® II*</td>
<td>Active Ingredient: 13.6% Triclopyr</td>
<td>UOM: Container 2.5 Gallon Container</td>
<td>Herbicide formulated as a liquid solution for basal bark and cut stump treatments.</td>
</tr>
<tr>
<td>Capstone®*</td>
<td>Active Ingredient: 2.22% Triisopropanas Salt; 16.22% Trethylamine Salt</td>
<td>UOM: Case 2.5 Gallon Container 2 Per Case</td>
<td>Post emergent herbicide formulated as a liquid solution. Selective for a variety of weeds, vines, and brush.</td>
</tr>
<tr>
<td>Esplanade® 200SC*</td>
<td>Active Ingredient: Indaziflam 19.05%</td>
<td>UOM: Container 32oz Container</td>
<td>Pre-emergent, soil active herbicide formulated as a liquid solution. Non-selective.</td>
</tr>
<tr>
<td>RoundUp Pro Max**</td>
<td>Active Ingredient: 48.7% Glyphosate</td>
<td>UOM: Case 2.5 Gallon Container 2 Per Case</td>
<td>Post emergent herbicide formulated as a liquid solution. Non-selective.</td>
</tr>
<tr>
<td>Outrider®*</td>
<td>Active Ingredient: Sulfosulfuron 75%</td>
<td>UOM: Container 20oz Container</td>
<td>Selective, post emergent herbicide formulated as a liquid solution. Selective for perennial weeds and grasses.</td>
</tr>
<tr>
<td>Vista® XRT*</td>
<td>Active Ingredient: 45.52% Fluroxypyr</td>
<td>UOM: Case 2.5 Gallon Container 2 Per Case</td>
<td>Selective, post emergent herbicide formulated as a liquid solution. Selective for thistles, kochia, cactus, and other hard to kill weeds.</td>
</tr>
<tr>
<td>Control WM™*</td>
<td>Active Ingredient: 37% Polyvinyl Polymer</td>
<td>UOM: Container 1 Quart Container</td>
<td>Deposition aid and drift control formulated as a liquid solution. Compatible with all pesticides.</td>
</tr>
<tr>
<td>Herbicide Name</td>
<td>Active Ingredient</td>
<td>UOM</td>
<td>Description</td>
</tr>
<tr>
<td>-----------------------------------</td>
<td>-----------------------------------------------------------------------------------</td>
<td>-------------------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Prevent™ Anti-Foam</strong>*</td>
<td>Proprietary</td>
<td>Case 1 Quart Container 12 Containers Per Case</td>
<td>Anti-foaming compound formulated as a liquid solution. Compatible with all pesticides.</td>
</tr>
<tr>
<td><strong>Droplex®</strong></td>
<td>Active Ingredient: 100% Modified Vegetable Oil, polyoxyethylene sorbitan fatty acid ester, vegetable oil</td>
<td>Case 1 Gallon Container 4 Containers Per Case</td>
<td>Deposition aid and drift control formulated as a liquid solution. Compatible with all pesticides.</td>
</tr>
<tr>
<td><strong>Vastlan®</strong></td>
<td>Active Ingredient: 54.72% Triclopyr Choline</td>
<td>Case 2.5 Gallon Container 2 Containers Per Case</td>
<td>Post emergent, selective herbicide formulated as a liquid solution. Used for brush control and is aquatic approved.</td>
</tr>
<tr>
<td><strong>RoundUp Custom® or Equivalent</strong></td>
<td>Active Ingredient: 53.8% Glyphosate</td>
<td>Case 2.5 Gallon Container 2 Per Case</td>
<td>Post emergent, selective herbicide, formulated as a liquid solution. Selective for many aquatic species and is aquatic approved.</td>
</tr>
<tr>
<td><strong>Target® 6.6 or Equivalent</strong></td>
<td>Active Ingredient: 51% MSMA or above</td>
<td>Case 2.5 Gallon Container 2 Containers Per Case</td>
<td>Selective, post emergent herbicide formulated as a liquid solution. Selects for various weeds and is particularly effective on hard-to-kill johnsongrass.</td>
</tr>
<tr>
<td><strong>Imox™ or Equivalent</strong></td>
<td>Active Ingredient: 12.1% Ammonium Salt of Imazamox</td>
<td>Case 1 Gallon Container 4 Per Case</td>
<td>Post emergent, selective herbicide, formulated as a liquid solution. Selective for many aquatic species and is aquatic approved.</td>
</tr>
<tr>
<td><strong>Amdro® Fire Ant Bait or Equivalent</strong></td>
<td>Active Ingredient: .73% Hydramethylnon</td>
<td>Container 1 Pound Containers</td>
<td>Bait granules formulated specifically to target fire ants.</td>
</tr>
<tr>
<td></td>
<td>Active Ingredient</td>
<td>UOM:</td>
<td>Description</td>
</tr>
<tr>
<td>----------------</td>
<td>-----------------------------------------------------------------------------------</td>
<td>-------------------------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>JS 685</strong></td>
<td>.1% Pyrethrins 1.0% Piperonyl butoxide, technical 2-(2-butoxyethoxy) ethyl 6-propyli</td>
<td><strong>Case</strong> 12 Cans per Case 13oz Cans</td>
<td>Pesticide formulated to keep insects out of electrical boxes and equipment. Is active for up to 7 months. Product is non-conductive.</td>
</tr>
<tr>
<td><strong>Spectracide® Fire Ant Shield™ Mound Destroyer™ or Equivalent</strong></td>
<td>.04% Lambda-Cyhalothrin</td>
<td><strong>Case</strong> 2 Bags Per Case 3.5 Pound Bags</td>
<td>Bait granules formulated to destroy fire ant mounds. Targets queens of colonies to destroy the mound.</td>
</tr>
<tr>
<td><strong>Turbulence® Adjuvant or Equivalent</strong></td>
<td>100% Methylated vegetable oil, polyether modified polysiloxane, alkyl phenol ethoxylate</td>
<td><strong>Case</strong> 2.5 Gallon Containers 2 Containers Per Case</td>
<td>Methylated seed oil designed to increase penetration for control of brush and woody species. Product is aquatic approved.</td>
</tr>
<tr>
<td><strong>Aerosol Wasp/Hornet Killer</strong></td>
<td>.10% Tetramethrin .25% Permethrin .50% Piperonyl Butoxide 99.15% Other Ingredients</td>
<td><strong>Case</strong> 12 Cans per Case</td>
<td>Pesticide formulated to contact kill wasps and hornets.</td>
</tr>
<tr>
<td><strong>Gopher Bait</strong></td>
<td>2% Zinc Phosphide</td>
<td><strong>Bag</strong> 50 Pound Bag</td>
<td>Bait granules formulated to target gophers and other pest rodents.</td>
</tr>
<tr>
<td><strong>Blue Herbicide Dye</strong></td>
<td>100% Highly Concentrated Blue Dye in Aqueous Solution</td>
<td><strong>Case</strong> 2 Containers Per Case 2.5 Gallons Per Container</td>
<td>Dye formulated to allow viewing of areas that have been sprayed with herbicide.</td>
</tr>
<tr>
<td><strong>Red River 90 or Equivalent</strong></td>
<td>90% Alkylaryloxyethylene glycols free fatty acids</td>
<td><strong>Case</strong> 4 Containers per Case 1 Gallon Containers</td>
<td>Surfactant formulated as a liquid solution, increases absorption of spray mixes into target species. Product is aquatic approved.</td>
</tr>
<tr>
<td><strong>Amdro® Ant Block® or Equivalent</strong></td>
<td>.88% Hydramethylnon</td>
<td><strong>Package</strong> 24 ounce Package</td>
<td>Bait granules formulated specifically to target leaf cutter ants and other ant species aside from fire ants.</td>
</tr>
</tbody>
</table>
SECTION 16

16.0 | RECORD KEEPING

16.1 | Herbicide Records of Application Overview

- All applications contained in the record book are made for TxDOT purposes.
- Maintain records of ALL pesticide applications.
- Maintain records for 2 years.
- Furnish records to TDA if requested.
- Maintain records at principal place of business.
- Maintain copy of Direct Supervision Affidavit with records.
- The most current version of the "Herbicide Records" produced by TxDOT must be used for ALL applications made for TxDOT. If outside vendors are performing herbicide applications, the vendor is responsible for submitting agency approved documentation as outlined in the current Herbicide Operations Manual.

16.2 | Records Must Contain:

- Applicator name and license number.
- Date and start time of the application.
- Location of the land/site treated. For example: the highway number, mile marker or GPS location. Guardrail, Edge of Pavement, ROW-Overspray.
- Name of the plant pest. Be as specific as possible. For example: Johnsongrass.
- Application Method or Type of Equipment used to make the application. The following examples are to be used. Foliar-Edge, Foliar-Flex 5, Foliar-Fixed Boom, Foliar-Handgun, Foliar-Backpack, Basal Bark-Backpack, Cut Stump-Backpack, Painted-Backpack, Cut Stump-Handgun, Painted-Handgun, Basal Bark-Handgun.
- Product Name, taken from the label on the container poured.
- EPA Registration Number, taken from the label on the container poured.
- Rate of product per unit, can be found beginning on page 94 of this book and in the back of Herbicide Records books. Example: 8 ounces per acre.
- Temperature, Wind Velocity and Wind Direction, taken at the application location site immediately before application begins.
- Total volume sprayed, recorded after the application is completed.
- Every column should be completed for each product that is mixed and applied.

For occasions where a column is not applicable, such as Column C "Clean Water ADDED to Tank" when a tank is mixed and left over from the previous day or transferred to a different piece of application equipment and no additional products were added, a dash should be documented. Another occasion when a column may be not need is Column D "Herbicide Mix Already in Tank," if the tank is empty and a mix is being made. In that situation, there is not pre-existing mix present, therefore, a dash in the boxes for each product added to the tank should be documented. Dashes represent that the lack of information is intentional.
16.3 | District Review Recommendations

- Districts should perform an independent review of herbicide mixing and application records (Herbicide Records,) corresponding DAR’s, MMS, Compass, and ERP data entry monthly during the active herbicide season.
- Accurate recording of materials removed from inventory is recommended.
- End of the Month Operator reconciliation of Record Book and Daily Activity Report (DAR) or ERP equivalent.
- It is recommended that End of the Month Herbicide Inventory at MNT Sections be taken.
- End of the Month Section Herbicide Inventory reconciliation with District Herbicide Inventory.
- End of the Month Operator check of Record Book including that accurate documentation is present for (A) Herbicide and Additive, (B) EPA Registration Number, (G) Herbicide Application Rate and that calculations are correct.

16.4 | Maintenance Field Support Section Vegetation Specialist

MNT FSS employees will perform Record Book checks during the Annual Herbicide Certification Trainings in each District each year.

16.5 | Record Books

Accurate records are vital during herbicide mixing and application activities. These records permit the monitoring of the purchase and use of herbicides.

Texas Department of Agriculture (TDA) regulations require that records be maintained for a minimum period of 2 years from the date of application.

IT IS VERY IMPORTANT AT THE START OF EVERY SPRAYING SEASON TO GET A NEW RECORD BOOK AND START THE YEAR OFF RIGHT.

Records also help determine the effectiveness and durability of a herbicide treatment and will help to determine when an area should be retreated. Specify any unusual conditions that may exist at the time of application, and maintain daily spray records.

Your district Vegetation Manager or the Maintenance Field Support Section Staff of the Maintenance Division can supply you with additional record books.

16.6 | Changes to the 2021 Records Include:

- Function Codes
- Form 1593
- DAR examples
- Converting to Ounces

2. Data Integrity. Maintenance Division’s goal is to improve the data that is entered into the MMS system. Should information need to be pulled for an open records request (or any other purpose), it needs to be accurate. We need to know when RoundUp was sprayed on a certain highway on a certain date, and not necessarily when it was mixed into a tank.

3. Reporting. Once all maintenance sections implement this program, it will allow TxDOT administration and districts to be able to accurately identify herbicide distribution by pulling reports from MMS instead of tracking down the hard copies of the logs from the operators. It will also increase the accuracy of the maintenance cost for each roadway.
16.7 | Herbicide Conversion Program

Program Goals
The Herbicide Conversion Program was created to address several herbicide documentation issues.

1. Auditing purposes. Most of the maintenance sections across the state would fail an MMS herbicide audit. Many sections charge out their chemicals when they add them to the herbicide tanks. This causes all material costs to be added to the roadway(s) on Day 1 instead of the actual day and roadway(s) in which they were sprayed. The information documented in the Herbicide Record Books should match the Daily Activity Reports (work orders) in the MMS system. In many maintenance sections across the state, this is not the case.

The Process

Step 1
IMPORTANT: Maintenance sections need to inventory all non-stock herbicide chemicals. The district inventory coordinator (or whomever makes your district inventory adjustments) should manually adjust all herbicide chemicals back into PeopleSoft using Reason Code “Return” and the comment “Added Back to Stock – Herbicide Program.”

Step 2
Once all herbicide products are in stock, the office manager needs to convert each herbicide item from the current stocking unit of measure to ounces. To convert items to ounces, use the SSD instructions below.

1. In PeopleSoft, navigate to TxDOT Financials>Inventory>Inventory Transactions>Bin to Bin Transfers. (If using the Navigator bar on the right side of the PeopleSoft home screen use these Breadcrumbs Navigator>Financials>Inventory>Manage Inventory>Transfers.)
   a. User Entry: In the Unit box, enter the inventory business unit or use search icon to select.
   b. User Entry: In the Item ID box, enter NIGP or use search icon to select.
   c. User Action: Click the “Search” button.
   d. User Action: Review the Original Location details. Make note of the “Qty Available”, “Storage Location” and the UOM which is the standard UOM (in this example it is cases)
   e. User Action: Click the “Transfer” link in the Original Location group box.
2. The system will display the “Item Transfer” Tab where you will enter the specific details of the transfer transaction.

a. **User Entry:** In the Transfer Qty box, enter the quantity to transfer. The example depicts transferring all 12 cases.

b. **User Entry:** In the Storage Location box, click the search icons to specify the storage area and location.

c. **User Entry:** In the Quantity UOM box, use the search icon to select the alternate unit of measure for the transfer transaction.

d. **User Action:** At the Look Up Unit of Measure popup, click on “OZ.”

e. **System Action:** The system will use the UOM conversion rate and enter the quantity for the selected alternate unit of measure.

f. **User Action:** Click the “Save” button to complete the transaction.
Step 3

Maintenance Division recommends that Office Managers use the “Herbicide Inventory Tracker” spreadsheet to keep track of the inventory in the herbicide tank until it is sprayed on the roadway. The “tracker” can be found by clicking on this link [MMS Support Site>MMS Job Aids>Herbicide Conversion Program](#). It can also be located by following these same “breadcrumbs” on the MMS Support SharePoint Site. Each Office Manager should download a copy of the blank tracker to their computer. In addition to the blank “tracker,” there is also a sample Excel file from the Amarillo District. The sample document includes directions on how to complete the spreadsheet.

*Note: This form is optional; however, if not used, the maintenance section needs to develop a process to keep an accurate count of the section’s inventory in the herbicide tank(s).*

<table>
<thead>
<tr>
<th>Date</th>
<th>Type</th>
<th>W/O#</th>
<th>TARGET</th>
<th>DRIFT CONTOL DM</th>
<th>INLET</th>
</tr>
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<tbody>
<tr>
<td>6/7/2021</td>
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<td>32</td>
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<td>6/14/2021</td>
<td>addition</td>
<td>15</td>
<td>1</td>
<td>32</td>
<td></td>
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<tr>
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<td>1</td>
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</tr>
</tbody>
</table>
Step 4

The Herbicide Operator will document all chemicals removed from stock on Form 1593 - Materials Request Form. The form can be located on eForms or on the Herbicide Conversion Project page on the MMS SharePoint Site.

The chemicals added to Form 1593 need to match Column “J” on the 2021 Herbicide Record Book Mixing Records. Submit this form to the office manager each day chemicals are added to the herbicide tank.
In addition, the operator should document the same information in the comments section of the Daily Activity Report (DAR) the day the chemicals are mixed in tank. This provides a backup paper trail should Form 1593 get misplaced.

Note: If the operator uses a herbicide ratio that is not “standard,” it should also be documented in the comments section of the DAR.

Step 5
The office manager adds the quantities from the Form 1593 to the “Herbicide Inventory Tracker.” All additions will be positive numbers.

Note: The product names can be changed to match the section’s current inventory.
Step 6
As the herbicide operator sprays each day, he/she documents the chemicals used in Herbicide Application Records, as usual. When completing their Daily Activity Report for that day, they will document the exact quantities from column “X” of the 2021 Herbicide Record Book Application Record on the materials section of the Daily Activity Report.

Step 7
The office manager enters the DAR into MMS, as usual.
Step 8
The office manager documents the herbicide reported on the DAR as a negative amount in the “Herbicide Inventory Tracker.” As the quantities are entered, the balances will automatically update. **Note:** If you have more than one herbicide unit, make a separate tab in the spreadsheet for each vehicle. See the Amarillo sample document on the MMS Support Site for an example.

<table>
<thead>
<tr>
<th>Date</th>
<th>WOE</th>
<th>Roundup Pro Max</th>
<th>Escort XP</th>
<th>Outrider</th>
<th>Vista</th>
<th>Control WM</th>
</tr>
</thead>
<tbody>
<tr>
<td>6/18/2018</td>
<td>addition</td>
<td>400</td>
<td>50</td>
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<td>500</td>
<td>25</td>
</tr>
</tbody>
</table>

Ending Balance: 216

Step 9
Repeat the process throughout the herbicide season. This provides an easily accessible record of the maintenance sections herbicide usage for inventory purposes.

Support
The MMS Support Team is here for you. Our vision is to provide TxDOT Districts and Divisions with first-class customer service!

If you encounter issues or errors related to the Herbicide Conversion Program, please contact the MMS Help Desk at: MNT_Compass@txdot.gov.
HERBICIDE RECORDS

All applications contained in this record book are made for TxDOT and TxDOT purposes. All application records MUST be kept for a period of two years from the date of the application.

<table>
<thead>
<tr>
<th>Equipment Number</th>
<th>Start Date to End Date of Records contained in this book</th>
<th>Maintenance Section and Address</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Calibration Documentation

Turbo-Drop Nozzles should be calibrated annually, before making Edge of Pavement Applications. The Flex-5 spray head is pre-calibrated at 25 Gallons per Acre (GPA). Handgun applications are calibrated at 100 Gallons per Acre (GPA).

<table>
<thead>
<tr>
<th>Date of Calibration</th>
<th>Nozzle(s) Calibrated</th>
<th>Calibrated Rate (GPA)</th>
</tr>
</thead>
<tbody>
<tr>
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</table>

Unlicensed mixers/applicators must be directly supervised by a licensed applicator. The licensed applicator who is directly supervising must work out of the same office as the unlicensed employee. Keep a signed and dated copy of the Direct Supervision Affidavit in this record book.

Reviewed by MNT-FSS: _________________________________

[Diagram of Spray Areas: Inside, Middle, Edge, Outside]
Target Plant Species Key (N)

African Rue – AR
Bastard Cabbage (Turnip Weed, Mustard) – BCB
Bermudagrass – BB
Broomweed – BRMW
Brush – BR
Cactus – C
Cattails – CAT
Chinese Tallow – CT
Clover – OV
Complete Control (Bareground) – CC
Crapegrass – CBG
Creosote – CS
Curly Dock – CD
Curlycup Gumweed – CCG
Field Bindweed – FB
Giant Cane (Georgia Cane, Arundo donax) – GC
Giant Ragweed (Bloodweed) – GR
Guinea Grass – GG
Hackberry – HB
Horseweed – HW
Huisache – H
Johnsongrass – JG
Jointed Goatgrass – JNTG
Kochia – K
Kudzu – KUD

Add any Plant Target Species that you treat (not found in the above list) with the abbreviation you use:

Liveoak – L
Marestail – MT
Mosquito – M
Morningglory – MG
Musk Thistle – MUT
Phragmites – PHG
Pigweed (Careless Weed) – PGW
Prickly Lettuce – PL
Retama – R
Russian Thistle – RT
Saltcedar – SC
Silveryleaf Nightshade – SLN
Sow Thistle – ST
Sunflower – S
Switchgrass – SW
Texas Goanweed – TXGW
Thistle – T
Vasey Grass – VG
Vetch – V
Western Bitterweed – WB
Western Ragweed – WRAG
Wild oats – WO
Willow – W
Willow Baccharis – WBC

Product Key (A)

Drift Control – DC
Escort® XP – Escort
EsplAnade® 200 SC – Esplanade
RoundUp PROMAX® – RUPM
Target® 6.6 – Target
Vista® XRT – Vista

Site Abbreviations (O)

Cable Barrier – CB
Curb/Gutter – CG
East Bound – EB
Edge of Pavement – E
Fixtures (Signs, Delineators) – F
Guardrail – G
Inside – IN
Median – M
North Bound – NB
Outside – OUT
Right-Of-Way – ROW
Rip-Rap – RR
South Bound – SB
Stockpiles – S
Stockpiles – W
West Bound – WB

Calculating Pathfinder II Applications

Operator would need to document how many ounces were applied. Example: 1 gallon = 128 ounces

Then divide the amount applied (that’s been converted to ounces) by 0.00735. 0.00735 represents how much of an ounce of Pathfinder II treats a square foot. (There are 43,560 square feet in 1 acre.)

Example: 128 / 0.00735 = 17,414.97, we suggest rounding up to 17,415 square feet. (This is approximately 40% of one acre.)

Operator would document the 17,415 square feet in column “U” and for the rate documented in columns “G” and “V”.

To check the calculation, multiply the square feet calculated (17,415) by the constant (0.00735). The answer should equal how many ounces of Pathfinder II was applied (128 oz.)

17,415 * 0.00735 = 128 ounces
MAINTENANCE FUNCTION CODES

538 - Pest Control (AC)
Activities related to the use of predatory animal and insect control whether in turf and ornamental site or on the right of way.

Work items could include spreading fire ant baits, mosquito tablets, and other types of pest control products on the ROW.

540 - Chemical Vegetation Control by Hand (HR)
Hand cleaning vegetation out of islands, medians, riprap, drainage channels, etc. by chemical means.

Function 540 should be used for all vegetation control activities using a handgun. Applications include handguns attached to herbicide trucks, skid mounted herbicide rigs, small portable tanks, and backpacks. Function 540 is intended for use in difficult to reach areas, areas with sensitive plant material in close proximity, precision applications such as cracks in concrete, between signs in medians and around guardrails.

541 - Chemical Vegetation Control, Edges (AC)
Complete control of vegetation encroaching in pavement edges, shoulders, medians, islands and curbs with herbicides.

Function 541 should be used for all activities associated with herbicide applications to control vegetation that is creeping into the paved surface of shoulders of travel lanes, including the edges of islands, medians and curbs. Function 541 is intended for use when product is applied with a fixture boom or spray bar attached to a herbicide truck or slide-in rig. Work items should include the mixing and application of the herbicide.

542 - Chemical Vegetation Control, Overspray (AC)
Control of undesirable vegetation growth by overspraying wide areas of right of way, including fixtures (i.e. signs, delineators, guardrails, culverts, etc.) with herbicides.

Function 542 should be used for all activities associated with herbicide applications that overspray the right of way in an effort to control undesirable vegetation such as Field Bindweed, Johnsongrass, Huisache, and other specific invasive species.

544 - Chemical Vegetation Control, Rope-wick (AC)
Control of tall vegetation (i.e. Johnsongrass) in the right of way with wick applicator.

Function 544 is intended for all activities associated with herbicide application using a wick type applicator to control tall undesirable vegetation such as Johnsongrass, without affecting desirable vegetation such as native grasses and wildflowers.

545 - Chemical Vegetation Control, Basal Application (HR)
Control of undesirable brush species in the right of way with a low volume basal bark application.

Function 545 should be used for all activities associated with direct basal bark applications to control undesirable brush species such as mesquite. Function 545 should be limited to the mixing and hand application of a low volume of herbicide, applied in a band around the trunk of the pest species at the specified height. Basal bark applications should not be considered a handgun application.

552 - Tree and Brush Control (CLMI)
The trimming, pruning and disposal of shrubs, vines and trees (excluding picnic and rest areas).

Function 552 should be used for all activities associated with pruning or removing trees, shrubs and vines on the right of way. Work items could include pruning dead and overgrown branches, thinning out trees and shrubs, trimming vines and shrubs, hauling and disposing of plant materials including dead trees, operating a chipper to dispose of plant material, burning brush and dressing tree wounds when branches are removed. Function 552 could include mechanical or hand pruning.
MATERIALS AND SUPPLY
MATERIAL REQUEST

REQUESTED FROM:

REQUESTED BY:

CHARGED TO:
- DEPT: 
- FY: 
- ACCOUNT: 
- App. Class: 
- FUND: 
- TASK: 
- P.C. BUSINESS: 
- PROJECT: 
- ACTIVITY: 
- RES. TYPE: 

<table>
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SPECIAL INSTRUCTIONS:

REQUESTED BY: ____________________________  DATE: __________

APPROVED BY: ____________________________  DATE: __________
### MIXING RECORDS

If mixer is unlicensed, they need to be Directly Supervised by a Licensed Applicator working out of the same physical location and a TxDOT Direct Supervision Affidavit (Page 87) needs to be completed before any mixing occurs to ensure safe and lawful mixing.

Name of Mixer (person(s) who makes the mix): **Joe Snuffy**

License number of the person(s) who mixed or Applicator Directly Supervising unlicensed mixer: **1234567**

IF mixer is Unlicensed, then the Name of the licensed Applicator who is Directly Supervising the herbicide mixing:

<table>
<thead>
<tr>
<th>Date (MM/DD/RR)</th>
<th>A* Herbicide Product Name and Additives Mixed (D) Drift Control (S) Surfactant</th>
<th>B** EPA Registration Number (Additives do not have EPA Reg. Num.)</th>
<th>C Clean Water ADDED to tank (Gallons)</th>
<th>D Herbicide Mix Already in Tank (Gallons)</th>
<th>E Calibrated Rate (GPA)</th>
<th>F New Sprayable Acres ($E \times C$)</th>
<th>G Herbicide Application Rate (include units oz., pt., etc., /100 G)</th>
<th>H Herbicide Added to Tank (include units $F \times G$)</th>
<th>I Conversions to Ounces (OZ) $G \times 128$ for Gal, $G \times 32$ for QT, $G \times 16$ for PT</th>
<th>J Quantity Rec'd from Supply (This should be exactly what was poured into the tank and be reflected on Form 1593)</th>
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<tbody>
<tr>
<td>6/18/18</td>
<td>RUPM 524-579</td>
<td></td>
<td>1,250</td>
<td></td>
<td>25</td>
<td>50</td>
<td>8 oz./A 400 oz. 400 oz. 400 oz.</td>
<td>2 oz./A 25 oz. 25 oz. 25 oz.</td>
<td>2 oz./100 gal. 25 oz. 25 oz. 25 oz.</td>
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<tr>
<td></td>
<td>Escort 432-1549</td>
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<td></td>
<td></td>
<td></td>
<td>1 oz./A 50 oz. 50 oz. 50 oz.</td>
<td>1 oz./A 50 oz. 50 oz. 50 oz.</td>
<td>1 oz./A 50 oz. 50 oz. 50 oz.</td>
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<tr>
<td></td>
<td>Outrider 59639-223</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.33 oz./A 66.5 oz. 67 oz. 67 oz.</td>
<td>1.33 oz./A 66.5 oz. 67 oz. 67 oz.</td>
<td>1.33 oz./A 66.5 oz. 67 oz. 67 oz.</td>
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</tr>
<tr>
<td></td>
<td>Vista 62719-586</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>10 oz./A 500 oz. 500 oz. 500 oz.</td>
<td>10 oz./A 500 oz. 500 oz. 500 oz.</td>
<td>10 oz./A 500 oz. 500 oz. 500 oz.</td>
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</tr>
<tr>
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<td>D/S: Control WM</td>
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</tbody>
</table>

**Mixing notes:** 6/19/18 mix was leftover mix from 6/18/18

*See page 1 of Record Book for Abbreviation Keys. **Always get the EPA Reg. No. from the label on the container that is being poured. These numbers may not represent the EPA Reg. No. on product you are using.

**Reviewed by:**

Joe Snuffy
**APPLICATION RECORDS**

If applicator is unlicensed, they need to be Directly Supervised by a Licensed Applicator working out of the same physical location and a TxDOT Direct Supervision Affidavit (Page 87) needs to be completed before any applications occur to ensure safe and lawful applications.

**Name of Applicator (person(s) who makes the application):** Sam Smith

**License number of the person(s) who made application or Applicator Directly Supervising unlicensed applicator/operator:** 1234567

<table>
<thead>
<tr>
<th>Date (MM/DD/YY)</th>
<th>Location</th>
<th>Time</th>
<th>Weather</th>
<th>Volume</th>
<th>Rate</th>
<th>Herbicide Sprayed</th>
<th>Total DRIFT Sprayed</th>
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</thead>
<tbody>
<tr>
<td>6/18/18</td>
<td>IH 100 EB OUT</td>
<td>MM 1</td>
<td>10:30 a.m.</td>
<td>S</td>
<td>4</td>
<td>1,250</td>
<td>184 oz.</td>
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</tr>
<tr>
<td>6/19/18</td>
<td>IH 100 EB OUT</td>
<td>MM 15</td>
<td>8:30 a.m.</td>
<td>S</td>
<td>4</td>
<td>26.6 oz.</td>
<td>26.6 oz.</td>
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</tr>
<tr>
<td>6/19/18</td>
<td>IH 100 EB OUT</td>
<td>MM 35</td>
<td>12:30 p.m.</td>
<td>S</td>
<td>4</td>
<td>175</td>
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</tr>
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</table>

*See page 1 of Record Book for Abbreviation Keys.*
**MATERIALS AND SUPPLY**
**MATERIAL REQUEST**

<table>
<thead>
<tr>
<th>NIGP #</th>
<th>QTY</th>
<th>UOM</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
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<td>400</td>
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<td>RoundUp ProMax</td>
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<tr>
<td>Current NIGP #</td>
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<td>oz</td>
<td>Escort XP</td>
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<tr>
<td>Current NIGP #</td>
<td>67</td>
<td>oz</td>
<td>Outrider</td>
</tr>
<tr>
<td>Current NIGP #</td>
<td>500</td>
<td>oz</td>
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</tr>
<tr>
<td>Current NIGP #</td>
<td>25</td>
<td>oz</td>
<td>Control WM</td>
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</tbody>
</table>

**SPECIAL INSTRUCTIONS:**

Form 1593 should be completed anytime chemicals are added to the herbicide tank. This form should match your Herbicide Record Book Mixing Records for that day. “Non-stock” items are no longer allowed. Any containers that are not emptied should be returned to the Herbicide Cage for future use. Products should NOT be documented on the DAR until it is applied.

Important: Form 1593 must be submitted to the office prior to leaving the yard each day.

**Note:**

Since the 6/19/18 applications are only using mix from 6/18/18, NO Form 1593 is needed. The 6/18/18 Form 1593 turned in on 6/18/18 documents the mix used on 6/19/18.

A Form 1593 would be needed for the 6/19/18 application, **IF** additional products were added on 6/19/18.
**DAILY ACTIVITY REPORT**

<table>
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<tr>
<th>TxDOT Unit</th>
<th>1308</th>
<th>Work Order #</th>
<th>XXXXXXX</th>
<th>Work Date:</th>
<th>06/18/18</th>
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<tbody>
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<td>R07</td>
<td>Function Code</td>
<td>S42</td>
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<td>Employee Name</td>
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</tr>
<tr>
<td>1</td>
<td>Sam Smith</td>
<td>3.75</td>
<td>SS</td>
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<tr>
<td>2</td>
<td>6</td>
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**Equipment**

<table>
<thead>
<tr>
<th>Equipment #</th>
<th>Operator/Initials</th>
<th>#Pass</th>
<th>Beg Odom</th>
<th>End Odom</th>
<th>Committed</th>
<th>Actual</th>
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<tbody>
<tr>
<td>Herbicide Truck #</td>
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<td>407</td>
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**Material**

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<th>Storage Area/Level</th>
<th>Qty</th>
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<tbody>
<tr>
<td>1</td>
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<td>184</td>
<td>oz</td>
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</tr>
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<td>2</td>
<td>Need to add NIGP Escort XP</td>
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<tr>
<td>3</td>
<td>Need to add NIGP Outrider</td>
<td>31</td>
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<td>4</td>
<td>Need to add NIGP Vista XRT</td>
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**Location**

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<th>End R M</th>
<th>End Disp</th>
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<td>23</td>
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</table>

**Comments/Leave Taken:**

To Calculate Acres:

\[
\text{L (feet) \times W (feet) / 43560 = AC (Round to the nearest whole number.))}
\]
Note:

No Form 1593 for 6/19. The 6/19 application used the mix that was from 6/18. Since NO additional inventory was taken from the storeroom, a Form 1593 for 6/19 is NOT needed.
**Daily Activity Report**

**TxDOT Unit:** 1308  
**Work Order #:** XXXXXX  
**Work Date:** 06/19/18

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<tr>
<td>Sam Smith</td>
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<td>S S</td>
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**Equipment**

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**Material**

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**Location**

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</tbody>
</table>

**Comments/Leave Taken:**

Used leftover mix from 6/18/19.
**MIXING RECORDS**

If mixer is unlicensed, they need to be Directly Supervised by a Licensed Applicator working out of the same physical location and a TxDOT Direct Supervision Affidavit (Page 87) needs to be completed before any mixing occurs to ensure safe and lawful mixing.

Name of Mixer (person(s) who makes the mix): _________________________________________________________________________________________________________________________________
License number of the person(s) who mixed or Applicator Directly Supervising unlicensed mixer: _______________________________________________________________________

IF mixer is Unlicensed, then the Name of the licensed Applicator who is Directly Supervising the herbicide mixing: _______________________________________________________________________________________

| Date       | A* Herbicide Product Name and Additives Mixed | B** EPA Registration Number (Additives do not have EPA Reg. Num.) | C Clean Water ADDED to tank (Gallons) | D Herbicide Mix Already in Tank (Gallons) | E Calibrated Rate (GPA) | F New Sprayable Acres (C + E) | G Herbicide Application Rate (include units oz, pt, /a, /100 G) | H Herbicide Added to Tank (include units) (F x G) | I Conversions to Ounces (OZ) (GAL x 128) Q to G (Q x 128) PT to G (PT x 16) | J Quantity Rec’d from Supply (This should be exactly what was poured into the tank and be reflected on Form 1593.) | 
|------------|-----------------------------------------------|---------------------------------------------------------------|--------------------------------------|-------------------------------------------|------------------------|-------------------------------|-------------------------------------------------|-----------------------------------------------|----------------------------------------------------------------|----------------------------------------------------------------|------------------------------------------------------------------|
| 6/20/18    | RUPM                                          | 524-579                                                       | 500                                  |                                           | 20                     | 25                           | 3 qt./A                          | 75 qt. (2,400 oz.)                          | 7.5(2.5 gal.) - 2,400 oz.                  | 2,400 oz.                                      |                                                                   |
|            | Esplanade                                     | 432-1516                                                      |                                      |                                           |                        |                               | 4 oz./A                          | 100 oz.                                   | 100 oz.                                      | 100 oz.                                       |                                                                   |
|            | D/S: Droplex                                  |                                                               |                                      |                                           |                        |                               |                                  |                                           |                                                                 |                                                                 |                                                                   |
| 9/15/18    | Rodeo                                         | 62719-324                                                     | 200                                  | 0                                         | 100                    | 2                            | 8 qt./100 gal.                     | 16 qt. (512 oz.)                           | 512 oz.                                      | 512 oz.                                       |                                                                   |
|            | Surfactant-Inlet                              |                                                               |                                      |                                           |                        |                               |                                  |                                           |                                                                 |                                                                 |                                                                   |
|            | D/S: Control WM                               |                                                               |                                      |                                           |                        |                               |                                  |                                           |                                                                 |                                                                 |                                                                   |
| 9/20/18    | Pathfinder II                                 | 62719-176                                                     | Ready to Use (RTU)                   | 0                                         | 2.5                    | 1                            | 2.5 gal./A                        | 2.5 gal. (320 oz.)                         | 2.5 gal. (320 oz.)                           | 320 oz.                                       |                                                                   |
|            | D/S:                                          |                                                               |                                      |                                           |                        |                               |                                  |                                           |                                                                 |                                                                 |                                                                   |

- *See page 1 of Record Book for Abbreviation Keys.
- **Always get the EPA Reg. No. from the label on the container that is being poured. These numbers may not represent the EPA Reg. No. on product you are using.
- Reviewed by: ____________________________________________________________________________________________
# APPLICATION RECORDS

If applicator is unlicensed, they need to be Directly Supervised by a Licensed Applicator working out of the same physical location and a TxDOT Direct Supervision Affidavit (Page 87) needs to be completed before any applications occur to ensure safe and lawful applications.

If applicator is Unlicensed, then the Name of the licensed Applicator who is Directly Supervising the herbicide applicator:

Joe Snuffy

**License number of the person(s) who made application or Applicator Directly Supervising unlicensed applicator/operator:** 1234567

---

<table>
<thead>
<tr>
<th>Date (MM/DD/YY)</th>
<th>K Highway Number</th>
<th>L Application Start</th>
<th>M Application End</th>
<th>N Target Plant</th>
<th>O Site</th>
<th>P Weather (Taken at application site before application)</th>
<th>Q Gallons at Start of Appl. (C + D)</th>
<th>R Application Method/ Type of Equip.</th>
<th>S Total Volume Sprayed (Gallons)</th>
<th>T Calibrated Rate GPA (E)</th>
<th>U Total Acres Sprayed (S ÷ T)</th>
<th>V Application Rate</th>
<th>W Total Herbicide Sprayed (U x V)</th>
<th>X Conversions to Ounces (OZ)</th>
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<td>6/20/18</td>
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<td>MM 8 7:30 a.m.</td>
<td>MM 35 11:30 a.m.</td>
<td>CC E</td>
<td>W</td>
<td>4.8 80 500</td>
<td>E</td>
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</tr>
<tr>
<td>9/15/18</td>
<td>SH 6 EB OUT</td>
<td>Navasota River</td>
<td>MP 175 12:30 p.m.</td>
<td>CAT ROW S</td>
<td>9</td>
<td>93 200 H 200</td>
<td>4</td>
<td>2</td>
<td>100</td>
<td>2</td>
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<td>(At Brazos Co. line)</td>
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</tr>
<tr>
<td>9/20/18</td>
<td>SH 83 NB IN</td>
<td>MM 56 9:30 a.m.</td>
<td>Navasota River</td>
<td>M ROW W</td>
<td>5</td>
<td>83 2.5 B 2.5</td>
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</tbody>
</table>

## Application notes:

**6/20/18** Saw aerial applicator making application to ranch adjacent to SH 83 NB ROW.

**9/15/18** 4 oz. of drift control in application.

Reviewed by:

---

*See page 1 of Record Book for Abbreviation Keys.*
**MATERIALS AND SUPPLY MATERIAL REQUEST**

**DATE:** 6-20-18

**REQUESTED FROM:**

**REQUESTED BY:**

**CHARGED TO:**
- **DEPT:** 14301
- **FY:** 18
- **ACCOUNT:**
- **App. Class:**
- **FUND:**
- **TASK:**
- **P.C. BUSINESS:**
- **PROJECT:**
- **ACTIVITY:**
- **RES. TYPE:**

**CONTROL NO.:**

**MSR NO.:**

<table>
<thead>
<tr>
<th>NIGP #</th>
<th>QTY</th>
<th>UOM</th>
<th>PRIORITY</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Add in current NIGP</td>
<td>2400</td>
<td>OZ</td>
<td></td>
<td>RoundUp ProMax</td>
</tr>
<tr>
<td>Add in current NIGP</td>
<td>100</td>
<td>OZ</td>
<td></td>
<td>Esplanade 200 SC</td>
</tr>
<tr>
<td>Add in current NIGP</td>
<td>250</td>
<td>OZ</td>
<td></td>
<td>Droplex</td>
</tr>
</tbody>
</table>

**SPECIAL INSTRUCTIONS:**

**REQUESTED BY:** Sam Smith  
**DATE:** 6/20/18

**APPROVED BY:**

**DATE:**
**DAILY ACTIVITY REPORT**

<table>
<thead>
<tr>
<th>TxDOT Unit</th>
<th>Function Code</th>
<th>UOM</th>
<th>Task Num</th>
<th>Emergency?</th>
</tr>
</thead>
<tbody>
<tr>
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**EMPLOYEE**

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<tr>
<th>Employee Name</th>
<th>Hours</th>
<th>Initials</th>
<th>Employee Name</th>
<th>Hours</th>
<th>Initials</th>
</tr>
</thead>
<tbody>
<tr>
<td>Joe Snuffy</td>
<td>4</td>
<td>JS</td>
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<td>5</td>
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**EQUIPMENT**

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<tr>
<th>Equipment #</th>
<th>Operator/Initials</th>
<th>#Pass</th>
<th>Beg Odom</th>
<th>End Odom</th>
<th>Committed</th>
<th>Actual</th>
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<tbody>
<tr>
<td>1</td>
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**MATERIAL**

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<th>Storage Area/Level</th>
<th>Qty</th>
<th>UOM</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>RoundUP Pro Max</td>
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<td>2,400</td>
<td>oz</td>
</tr>
<tr>
<td>2</td>
<td>Esplanade 200 SC</td>
<td></td>
<td>100</td>
<td>oz</td>
</tr>
<tr>
<td>3</td>
<td>Droplex</td>
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<td>250</td>
<td>oz</td>
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**LOCATION**

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<thead>
<tr>
<th>Highway</th>
<th>County</th>
<th>Class</th>
<th>Beg RM</th>
<th>Beg Disp</th>
<th>End RM</th>
<th>End Disp</th>
<th>Qty</th>
<th>Asset ID</th>
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<tbody>
<tr>
<td>FM 1407</td>
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<td>35</td>
<td>25</td>
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**COMMENTS/LEAVE TAKEN:**

To Calculate Acres:

\[ \text{L (feet) \times W (feet)} / 43560 = \text{AC (Round to the nearest whole number.)} \]
<table>
<thead>
<tr>
<th>NIGP #</th>
<th>QTY</th>
<th>UOM</th>
<th>PRIORITY</th>
<th>DESCRIPTION</th>
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</thead>
<tbody>
<tr>
<td>Add in current NIGP</td>
<td>512</td>
<td>OZ</td>
<td></td>
<td>Rodeo</td>
</tr>
<tr>
<td>Add in current NIGP</td>
<td>128</td>
<td>OZ</td>
<td></td>
<td>Inlet</td>
</tr>
<tr>
<td>Add in current NIGP</td>
<td>128</td>
<td>OZ</td>
<td></td>
<td>Control WM</td>
</tr>
</tbody>
</table>

SPECIAL INSTRUCTIONS:

REQUESTED BY: Sam Smith  
DATE: 9/15/18

APPROVED BY:  
DATE:  

DEPT: 17310
FY: 19
ACCOUNT:  
App. Class:  
FUND:  
TASK:  
P.C. BUSINESS:  
PROJECT:  
ACTIVITY:  
RES. TYPE:  
CONTROL NO.:  
MSR NO.:  

9/15/18
## DAILY ACTIVITY REPORT

**Form 1757-ALT (Rev. 9/19) Page 1 of 1**

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<tr>
<th>TxDOT Unit</th>
<th>Work Order #</th>
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<th>Work Date: 09/15/18</th>
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### Planning Activity

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<th>Code</th>
<th>UOM</th>
<th>HR</th>
<th>Task Num</th>
<th>Emergency</th>
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<tbody>
<tr>
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### Employee Information

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<thead>
<tr>
<th>Employee Name</th>
<th>Hours</th>
<th>Initials</th>
</tr>
</thead>
<tbody>
<tr>
<td>Joe Snuffy</td>
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<td>JS</td>
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</table>

### Equipment Information

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<tr>
<th>Equipment #</th>
<th>Operator/Initials</th>
<th># Pass</th>
<th>Beg Odom</th>
<th>End Odom</th>
<th>Committed</th>
<th>Actual</th>
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</thead>
<tbody>
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<td>1</td>
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<td>129</td>
<td>2.5</td>
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### Material Information

<table>
<thead>
<tr>
<th>NIGP #</th>
<th>Material Name</th>
<th>Storage Area/Level</th>
<th>Qty</th>
<th>UOM</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Rodeo</td>
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<td>512</td>
<td>oz</td>
</tr>
<tr>
<td>2</td>
<td>Inlet</td>
<td></td>
<td>128</td>
<td>oz</td>
</tr>
<tr>
<td>3</td>
<td>Control WM</td>
<td></td>
<td>4</td>
<td>oz</td>
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### Location Information

<table>
<thead>
<tr>
<th>Highway</th>
<th>County</th>
<th>Class</th>
<th>Beg RM</th>
<th>Beg Disp</th>
<th>End RM</th>
<th>End Disp</th>
<th>Qty</th>
<th>Asset ID</th>
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<td>175</td>
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### Comments/Leave Taken:

**NOTE to Operator:**

When a function code has a unit of measure of hours, your quantity (QTY) should match the number of hours you record in the employee hours section above.

If there is more than one roadway listed, the QTY of each roadway should be added together to match your total numbers worked.
### MATERIALS AND SUPPLY
#### MATERIAL REQUEST

**DATE:** 9/20/18

**REQUESTED FROM:**

**REQUESTED BY:**

**CHARGED TO:**

<table>
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<tr>
<th>DEPT</th>
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<th>APP. CLASS</th>
<th>FUND</th>
<th>TASK</th>
<th>P.C. BUSINESS</th>
<th>PROJECT</th>
<th>ACTIVITY</th>
<th>RES. TYPE</th>
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**SPECIAL INSTRUCTIONS:**

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<th>PRIORITY</th>
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<tbody>
<tr>
<td>7310</td>
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<td>OZ</td>
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<td>Pathfinder II</td>
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**REQUESTED BY:** Sam Smith  
**REQUESTED FROM:** 9/20/18  
**ADDITIONAL NIGP:** Add in current NIGP  
**APPROVED BY:**  
**APPROVED DATE:**  
**DATE:** 9/20/18
**DAILY ACTIVITY REPORT**

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<thead>
<tr>
<th>Planning Activity</th>
<th>Function Code</th>
<th>UOM</th>
<th>Task Num</th>
<th>Emergency?</th>
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<th>Hours</th>
<th>Initials</th>
<th>Employee Name</th>
<th>Hours</th>
<th>Initials</th>
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<td>Joe Snuffy</td>
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<table>
<thead>
<tr>
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<th>Operator/Initials</th>
<th>#Pass</th>
<th>Beg Odom</th>
<th>End Odom</th>
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<th>Actual</th>
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<table>
<thead>
<tr>
<th>Material Name</th>
<th>Storage Area/Level</th>
<th>Qty</th>
<th>UOM</th>
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<table>
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<th>Class</th>
<th>Beg RM</th>
<th>Beg Disp</th>
<th>End RM</th>
<th>End Disp</th>
<th>Qty</th>
<th>Asset ID</th>
</tr>
</thead>
<tbody>
<tr>
<td>SH 83</td>
<td>Grimes</td>
<td>03</td>
<td>56</td>
<td>58</td>
<td>5</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>
### MIXING RECORDS

If mixer is unlicensed, they need to be Directly Supervised by a Licensed Applicator working out of the same physical location and a TxDOT Direct Supervision Affidavit (Page 87) needs to be completed before any mixing occurs to ensure safe and lawful mixing.

Name of Mixer (person(s) who makes the mix): _________________________________________________________________________________________________________________________________

License number of the person(s) who mixed or Applicator Directly Supervising unlicensed mixer: _______________________________________________________________________

IF mixer is Unlicensed, then the Name of the licensed Applicator who is Directly Supervising the herbicide mixing:

---

<table>
<thead>
<tr>
<th>Date (MM/DD/YY)</th>
<th>Herbicide</th>
<th>EPA Registration Number</th>
<th>Clean Water ADDED to tank (Gallons)</th>
<th>Herbicide Mix Already in Tank (Gallons)</th>
<th>Calibrated Rate (GPA)</th>
<th>New Sprayable Acres (C + E)</th>
<th>Herbicide Application Rate (include units oz, pt/a, /100 gal)</th>
<th>Herbicide Added to Tank (include units) (F x G)</th>
<th>Conversions to Ounces (OZ) (H) x ___</th>
<th>Quantity Rec’d from Supply (This should be exactly what was poured into the tank and be reflected on Form 1593)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10/3/18 Capstone</td>
<td>62719-572</td>
<td>500 0 25 20</td>
<td>6 pt/A (96 oz) 120 pt (1920 oz) (6) 2.5 gal (1920 oz) 1920 oz</td>
<td>10 oz/A 200 oz 200 oz 200 oz</td>
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<tr>
<td>10/3/18 Vista</td>
<td>62719-586</td>
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<tr>
<td>10/3/18 Surfactant-Inlet</td>
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<td>10/3/18 D/S: Control WM</td>
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</tr>
<tr>
<td>10/5/18 Capstone</td>
<td>62719-572</td>
<td>1000 0 25 40</td>
<td>6 pts/A (96 oz) 240 pt (3840 oz) (12) 2.5 gal = 3840 oz 3840 oz</td>
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<tr>
<td>10/5/18 Vista</td>
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<tr>
<td>10/5/18 Surfactant-RR90</td>
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<tr>
<td>10/5/18 D/S: Deplex</td>
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</tr>
<tr>
<td>10/5/18 Capstone</td>
<td>62719-572</td>
<td>750 250 25 30</td>
<td>6 pts/A (96 oz) 180 pt (2880 oz) (9) 2.5 gal = 2880 oz 2880 oz</td>
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<tr>
<td>10/5/18 Vista</td>
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<td>10/5/18 D/S: Deplex</td>
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</table>

Mixing notes: Reviewed by: ____________________________________________________________________________________________

*See page 1 of Record Book for Abbreviation Keys. **Always get the EPA Reg. No. from the label on the container that is being poured. These numbers may not represent the EPA Reg. No. on product you are using.
**APPLICATION RECORDS**

If applicator is unlicensed, they need to be Directly Supervised by a Licensed Applicator working out of the same physical location and a TxDOT Direct Supervision Affidavit (Page 87) needs to be completed before any applications occur to ensure safe and lawful applications.

Name of Applicator (person(s) who makes the application): **Sam Smith**

License number of the person(s) who made application or Applicator Directly Supervising unlicensed applicator/operator: **1234567**

IF applicator is Unlicensed, then the Name of the licensed Applicator who is Directly Supervising the herbicide applicator: **Joe Snuffy**

<table>
<thead>
<tr>
<th>Date (MM/DD/YY)</th>
<th>K Highway Number</th>
<th>L Application Start</th>
<th>M Application End</th>
<th>N* Target Plant</th>
<th>O* Site</th>
<th>P Weather (Taken at application site before application)</th>
<th>Q Gallons at Start of Appl. (C + D)</th>
<th>R* Application Method/Type of Equip.</th>
<th>S Total Volume Sprayed (Gallons)</th>
<th>T Calibrated Rate GPA (E)</th>
<th>U Total Acres Sprayed (S ÷ T)</th>
<th>V Application Rate</th>
<th>W Total Herbicide Sprayed (U x V)</th>
<th>X Conversions to Ounces (OZ)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10/3/18</td>
<td>FM 555 WB</td>
<td>8:30 a.m.</td>
<td>45 82 91 W, 04, 33, 15 E</td>
<td>BR, HB, L</td>
<td>ROW S</td>
<td>4 78 500 F5</td>
<td>250</td>
<td>25 10</td>
<td>6 pt./A (96 oz./A) 60 pt. (960 oz.) 960 oz.</td>
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<tr>
<td></td>
<td>@ HWY 345</td>
<td>12 p.m.</td>
<td></td>
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<td></td>
<td></td>
<td>2 qt./100 gal. 5 qt. (160 oz.) 160 oz.</td>
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</tr>
<tr>
<td>10/3/18</td>
<td>FM 555 WB</td>
<td>1:00 p.m.</td>
<td>45 82 91 W, 04, 33, 15 E</td>
<td>BR, HB, L</td>
<td>ROW SE</td>
<td>9.3 92 250 F5</td>
<td>250</td>
<td>25 10</td>
<td>6 pt./A (96 oz./A) 60 pt. (960 oz.) 960 oz.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>@ HWY 345</td>
<td>4 p.m.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2 qt./100 gal. 5 qt. (160 oz.) 160 oz.</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>10/3/18</td>
<td>FM 3000 NB</td>
<td>9:00 a.m.</td>
<td>RM 29</td>
<td>11:30 a.m.</td>
<td>BR ROW S</td>
<td>4 3 78 1,000 F5</td>
<td>750</td>
<td>25 30</td>
<td>6 pt./A (96 oz./A) 180 pt. (2,880 oz) 2,880 oz.</td>
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<tr>
<td></td>
<td>OUT</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2 qt./100 gal. 15 qt. (480 oz.) 480 oz.</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>10/5/18</td>
<td>FM 3000 SB</td>
<td>1:30 p.m.</td>
<td>HWY 101</td>
<td>5:30 p.m.</td>
<td>BR ROW SE</td>
<td>7.8 87 1,000 F5</td>
<td>1,000</td>
<td>25 40</td>
<td>6 pt./A (96 oz./A) 240 pt. (3,840 oz) 3,840 oz.</td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td></td>
<td>OUT</td>
<td></td>
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<td></td>
<td></td>
<td>2 oz./100 gal. 20 qt. (640 oz) 640 oz.</td>
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</tr>
</tbody>
</table>

Application notes:

10/3/18 Stopped by angry citizen at end of a.m. application. Gave him my supervisors number, wants us to not spray in front of 514 FM 555.

10/3/18 5 oz. of drift control in application.
10/3/18 5 oz. of drift control in afternoon application.
10/5/18 25 oz. of drift control in application.

*See page 1 of Record Book for Abbreviation Keys.*

Reviewed by:
<table>
<thead>
<tr>
<th>NIGP #</th>
<th>QTY</th>
<th>UOM</th>
<th>PRIORITY</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Add in current NIGP</td>
<td>1920</td>
<td>OZ</td>
<td></td>
<td>Capstone</td>
</tr>
<tr>
<td>Add in current NIGP</td>
<td>200</td>
<td>OZ</td>
<td></td>
<td>Vista XRT</td>
</tr>
<tr>
<td>Add in current NIGP</td>
<td>320</td>
<td>OZ</td>
<td></td>
<td>Inlet</td>
</tr>
<tr>
<td>Add in current NIGP</td>
<td>10</td>
<td>OZ</td>
<td></td>
<td>Control WM</td>
</tr>
</tbody>
</table>

SPECIAL INSTRUCTIONS:

REQUESTED BY: Joe Snuffy  
DATE: 10/3/18

APPROVED BY: __________________________  
DATE: __________________________
## DAILY ACTIVITY REPORT

### EMPLOYEE

<table>
<thead>
<tr>
<th>Employee Name</th>
<th>Hours</th>
<th>Initials</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sam Smith</td>
<td>6.5</td>
<td>S5</td>
</tr>
</tbody>
</table>

### EQUIPMENT

<table>
<thead>
<tr>
<th>Equipment #</th>
<th>Operator/Initials</th>
<th>#Pass</th>
<th>Begin Odom</th>
<th>End Odom</th>
<th>Committed</th>
<th>Actual</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Herbicide Truck #</td>
<td>S5</td>
<td>696</td>
<td>702</td>
<td>6.5</td>
<td>6</td>
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</table>

### MATERIAL

<table>
<thead>
<tr>
<th>NIGP #</th>
<th>Material Name</th>
<th>Storage Area/Level</th>
<th>Qty</th>
<th>UOM</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Need to add NIGP</td>
<td>Capstone</td>
<td>1,920</td>
<td>oz</td>
</tr>
<tr>
<td>2</td>
<td>Need to add NIGP</td>
<td>Vista XRT</td>
<td>200</td>
<td>oz</td>
</tr>
<tr>
<td>3</td>
<td>Need to add NIGP</td>
<td>Inlet</td>
<td>320</td>
<td>oz</td>
</tr>
<tr>
<td>4</td>
<td>Need to add NIGP</td>
<td>Control WM</td>
<td>10</td>
<td>oz</td>
</tr>
</tbody>
</table>

### LOCATION

<table>
<thead>
<tr>
<th>Highway</th>
<th>County</th>
<th>Class</th>
<th>Beg RM</th>
<th>Beg Disp</th>
<th>End RM</th>
<th>End Disp</th>
<th>Qty</th>
<th>Asset ID</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>FM 555</td>
<td>Andrews</td>
<td>03</td>
<td>155</td>
<td>175</td>
<td>20</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### COMMENTS/LEAVE TAKEN:

Did all of the Westbound Outside ROW of FM 555.

### NOTE to Operator:

A lane mile is a mile of roadway in a single driving lane. The total lane mileage of a highway is found by multiplying the centerline mileage of a road by the number of lanes it has. Centerline miles (CLMI) measure the length of a road or highway regardless of how many lanes it has or how many times it was driven. Centerline miles are different than lane miles. (For instance, if there are only 10 centerline miles of roadway on a given roadway but it all consists of a five-lane highway, it would measure 50 lane miles.)
**MIXING RECORDS**

If mixer is unlicensed, they need to be Directly Supervised by a Licensed Applicator working out of the same physical location and a TxDOT Direct Supervision Affidavit (Page 87) needs to be completed before any mixing occurs to ensure safe and lawful mixing.

<table>
<thead>
<tr>
<th>Date (MM/DD/YR)</th>
<th><strong>A</strong></th>
<th><strong>B</strong></th>
<th><strong>C</strong></th>
<th><strong>D</strong></th>
<th><strong>E</strong></th>
<th><strong>F</strong></th>
<th><strong>G</strong></th>
<th><strong>H</strong></th>
<th><strong>I</strong></th>
<th><strong>J</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Name of Mixer (person(s) who makes the mix):</td>
<td>License number of the person(s) who mixed or Applicator Directly Supervising unlicensed mixer:</td>
<td>IF mixer is Unlicensed, then the Name of the licensed Applicator who is Directly Supervising the herbicide mixing:</td>
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</tbody>
</table>

| **A** | Herbicide Product Name and Additives Mixed (D) Drift Control (S) Surfactant | **B** | EPA Registration Number (Additives do not have EPA Reg. Num.) | **C** | Clean Water Added to tank (Gallons) | **D** | Herbicide Mix Already in Tank (Gallons) | **E** | Calibrated Rate (GPA) | **F** | New Sprayable Acres (C + E) | **G** | Herbicide Application Rate (include units-oz, pt./a,/100 G) | **H** | Herbicide Added to Tank (include units) (F x G) | **I** | Conversions to Ounces (OZ) (H) x ___ Gal to 02 (Gal x 138) Qt to 02 (Qt x 32) Pt to 02 (Pt x 16) | **J** | Quantity Rec’d from Supply (This should be exactly what was poured into the tank and be reflected on Form 1593) |
|-------|-----------------|-------|-----------------|-------|-----------------|-------|-----------------|-------|-----------------|-------|-----------------|-------|-----------------|-------|-----------------|-------|-----------------|
|       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |
|       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |
|       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |
|       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |
|       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |
|       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |
|       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |
|       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |       |                 |

Mixing notes: Reviewed by:

*See page 1 of Record Book for Abbreviation Keys. **Always get the EPA Reg. No. from the label on the container that is being poured. These numbers may not represent the EPA Reg. No. on product you are using.
APPLICATION RECORDS

If applicator is unlicensed, they need to be Directly Supervised by a Licensed Applicator working out of the same physical location and a TxDOT Direct Supervision Affidavit (Page 87) needs to be completed before any applications occur to ensure safe and lawful applications.

Name of Applicator (person(s) who makes the application): Joe Snuffy

License number of the person(s) who made application or Applicator Directly Supervising unlicensed applicator/operator: 1234567

If applicator is Unlicensed, then the Name of the licensed Applicator who is Directly Supervising the herbicide applicator: 

<table>
<thead>
<tr>
<th>Date (MM/DD/YR)</th>
<th>K Highway Number</th>
<th>L Application Start</th>
<th>M Application End</th>
<th>N* Target Plant</th>
<th>O* Site</th>
<th>P Weather (Taken at application site before application)</th>
<th>Q Gallons at Start of Appl. (C + D)</th>
<th>R* Application Method/Type of Equip.</th>
<th>S Total Volume Sprayed (Gallons)</th>
<th>T Calibrated Rate GPA (E)</th>
<th>U Total Acres Sprayed (S + T)</th>
<th>V Application Rate</th>
<th>W Total Herbicide Sprayed (U x V)</th>
<th>X Conversions to Ounces (OZ) (Gallons to OZ (Gal x 128) Pint to OZ (Pt x 16) This amount should be reflected on DAR)</th>
</tr>
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</tbody>
</table>

Application notes: Reviewed by:

*See page 1 of Record Book for Abbreviation Keys.
Remember!

- Maintain Accurate Records for 2 Years from Date of Application
- Do your Records AS YOU GO (Don't Wait)
- Maintain Records on ALL Pesticide Applications including:
  - Stockpiles
  - Rest Areas
  - Signal Boxes
  - Maintenance Office

Records can be your BEST FRIEND!
Herbicide Licenses and Responsibilities

Through an agreement with the Texas Department of Agriculture (TDA), TxDOT personnel are issued a “Noncommercial Political Pesticide Applicators License” after receiving training and passing a 2-part exam given by personnel within the Maintenance Field Support Section in the Maintenance Division (MNT). Once you are licensed, it is your individual responsibility to ensure that your license remains current.

License Year

Your license is effective for a 12 month period which starts September 1st. In order to maintain your license, you must meet TDA’s annual CEU requirements.

Self-Certification

Personnel within the Maintenance Field Support Staff of MNT provide annual training seminars, which will satisfy TDA’s current CEU (continuing education units) requirements (5 hours per year). These training sessions are provided by MNT between January and June of each year, and held in each district. MNT personnel send an annual report to TDA with the names of each employee who attended the training, and who sat for examination. Correspondence training can only be attended every other year and must be completed by the determined due date.

Each Year Thereafter

As long as you remain in TxDOT’s program, you must attend one of the training sessions offered by TxDOT.
If You Leave TxDOT Employment

If you leave TxDOT employment – you must surrender your TxDOT issued NonCommercial Political Pesticide Applicators License. Leave your yellow applicators license with your Supervisor. Supervisors need to write CANCEL across the original license and send original to MNT-FSS for cancellation. Applicator must make a copy for themselves of the last two years of application records, in case of an inspection by TDA. Original Application Records must stay at the TxDOT Maintenance Section Office.

Who Ya Gonna’ Call?

If you are having licensing difficulties, or have questions about your Noncommercial Political Pesticide Applicators License, contact:

1) Your district Vegetation Manager; or

2) Travis Jez MNT FSS at (512) 913-7240
## Area Coverage at Different Speeds

<table>
<thead>
<tr>
<th>Spray Width in Inches (Feet)</th>
<th>Speed of Application (Miles per Hour)</th>
<th>5 MPH</th>
<th>10 MPH</th>
<th>11.36 MPH</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<tr>
<td>12&quot; (1)</td>
<td></td>
<td>0.6</td>
<td>1.2</td>
<td>1.4</td>
</tr>
<tr>
<td>24&quot; (2)</td>
<td></td>
<td>1.2</td>
<td>2.4</td>
<td>2.8</td>
</tr>
<tr>
<td>36&quot; (3)</td>
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<td>3.6</td>
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</tr>
<tr>
<td>48&quot; (4)</td>
<td></td>
<td>2.4</td>
<td>4.8</td>
<td>5.5</td>
</tr>
<tr>
<td>60&quot; (5)</td>
<td></td>
<td>3.0</td>
<td>6.0</td>
<td>6.9</td>
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<td>72&quot; (6)</td>
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<td>3.6</td>
<td>7.2</td>
<td>8.3</td>
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<tr>
<td>84&quot; (7)</td>
<td></td>
<td>4.2</td>
<td>8.4</td>
<td>9.6</td>
</tr>
<tr>
<td>96&quot; (8)</td>
<td></td>
<td>4.8</td>
<td>9.6</td>
<td>11.0</td>
</tr>
<tr>
<td>108&quot; (9)</td>
<td></td>
<td>5.5</td>
<td>11.0</td>
<td>12.4</td>
</tr>
<tr>
<td>120&quot; (10)</td>
<td></td>
<td>6.1</td>
<td>12.2</td>
<td>13.8</td>
</tr>
<tr>
<td>180&quot; (15)</td>
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<td>9.1</td>
<td>18.2</td>
<td>20.7</td>
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<tr>
<td>240&quot; (20)</td>
<td></td>
<td>12.1</td>
<td>24.2</td>
<td>27.5</td>
</tr>
<tr>
<td>300&quot; (25)</td>
<td></td>
<td>15.2</td>
<td>30.4</td>
<td>34.4</td>
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<tr>
<td>360&quot; (30)</td>
<td></td>
<td>18.2</td>
<td>36.4</td>
<td>41.3</td>
</tr>
<tr>
<td>420&quot; (35)</td>
<td></td>
<td>21.2</td>
<td>42.4</td>
<td>48.2</td>
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</tbody>
</table>
### Quick Rate Chart for Percentage (%) Solutions

<table>
<thead>
<tr>
<th>With This Volume of Water</th>
<th>¼ of 1%</th>
<th>½ of 1%</th>
<th>1%</th>
<th>1½%</th>
<th>2%</th>
<th>2½%</th>
<th>3%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Gal (128 Oz)</td>
<td>0.3 oz</td>
<td>0.6 oz</td>
<td>1.3 oz</td>
<td>1.9 oz</td>
<td>2.6 oz</td>
<td>3.2 oz</td>
<td>3.8 oz</td>
</tr>
<tr>
<td>2 Gal (256 Oz)</td>
<td>0.6 oz</td>
<td>1.3 oz</td>
<td>2.6 oz</td>
<td>3.8 oz</td>
<td>5.1 oz</td>
<td>6.4 oz</td>
<td>7.5 oz</td>
</tr>
<tr>
<td>3 Gal (384 Oz)</td>
<td>1 oz</td>
<td>1.9 oz</td>
<td>3.8 oz</td>
<td>5.8 oz</td>
<td>7.7 oz</td>
<td>9.6 oz</td>
<td>11.5 oz</td>
</tr>
<tr>
<td>4 Gal (512 Oz)</td>
<td>1.3 oz</td>
<td>2.6 oz</td>
<td>5.1 oz</td>
<td>7.7 oz</td>
<td>10.2 oz</td>
<td>12.8 oz</td>
<td>15.4 oz</td>
</tr>
<tr>
<td>5 Gal (640 Oz)</td>
<td>1.6 oz</td>
<td>3.2 oz</td>
<td>6.4 oz</td>
<td>9.6 oz</td>
<td>12.8 oz</td>
<td>16 oz (1 Pint)</td>
<td>19.2 oz</td>
</tr>
<tr>
<td>10 Gal (1,280 Oz)</td>
<td>3.2 oz</td>
<td>6.4 oz</td>
<td>12.8 oz</td>
<td>19.2 oz</td>
<td>25.6 oz</td>
<td>32 (1 Quart)</td>
<td>384 (12 Quarts)</td>
</tr>
<tr>
<td>25 Gal (3,200 Oz)</td>
<td>8 (½ Pint)</td>
<td>16 (1 Pint)</td>
<td>32 (1 Quart)</td>
<td>48 (1½ Quarts)</td>
<td>64 (2 Quarts)</td>
<td>80 (2½ Quarts)</td>
<td>96 (3 Quarts)</td>
</tr>
<tr>
<td>50 Gal (6,400 Oz)</td>
<td>16 (1 Pint)</td>
<td>32 (1 Quart)</td>
<td>64 (2 Quarts)</td>
<td>96 (3 Quarts)</td>
<td>128 (4 Quarts)</td>
<td>160 (5 Quarts)</td>
<td>192 (6 Quarts)</td>
</tr>
<tr>
<td>100 Gal (12,800 Oz)</td>
<td>32 (1 Quart)</td>
<td>64 (2 Quarts)</td>
<td>128 (4 Quarts)</td>
<td>196 (6 Quarts)</td>
<td>256 (8 Quarts)</td>
<td>320 (10 Quarts)</td>
<td>384 (12 Quarts)</td>
</tr>
</tbody>
</table>

### Standard Rate Conversions

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Gallon</td>
<td>4 Quarts</td>
</tr>
<tr>
<td>1 Gallon</td>
<td>8 Pints</td>
</tr>
<tr>
<td>1 Gallon</td>
<td>128 Ounces</td>
</tr>
<tr>
<td>1 Quart</td>
<td>2 Pints</td>
</tr>
<tr>
<td>1 Quart</td>
<td>32 Ounces</td>
</tr>
<tr>
<td>1 Pint</td>
<td>16 Ounces</td>
</tr>
<tr>
<td>1 Cup</td>
<td>8 Ounces</td>
</tr>
<tr>
<td>1 Acre</td>
<td>43,560 Sq. Feet</td>
</tr>
<tr>
<td>1 Mile</td>
<td>5,280 Feet</td>
</tr>
</tbody>
</table>
Calibrating the Calc-an-Acre II

1. With power off - select "Area", press "CAL/RESET" and turn vehicle on.
2. Then put in "HOLD" mode and press "CAL" until the word CAL shows up on display.
3. Press "CAL" again until not displaying.
4. Put in "HOLD" mode and turn knob to "Distance" and be sure display shows “0”.
5. If not, press “RESET” until display shows “0” and the word “CLEAR” will also be displayed when reset is pressed prior to showing “0”.
6. Before driving “500 feet” use the “RUN/HOLD” button to start and stop the counting function.
7. Press “RUN” when passing the starting flag to activate the distance counting function.
8. Travel 500 feet and at the end of 500 feet press the “HOLD” button.
9. Press and hold the “CAL” button for one second.
10. Press “CAL” again and the word “CAL” will begin to flash and distance traveled will be displayed.
11. When “CAL” is flashing verify whether the number displayed is the exact distance (500 feet) that you drove. If not, press the “+” or “-” key to adjust the figure to “500” (or as close as possible to 500), which will match the distance you actually drove. Finally, push and hold “CAL” for one second.
12. Read the new circumference number “__ _____” and record it.
13. Then select “Speed” on dial and check speed against speedometer.
Control Head and Digital Speed Indicator

Truck application speed should always be read from the Digital Speed Indicator.

The cab-mounted control head powers up to 6 nozzle banks and raises the Flex-5 boom up and down.
Drift Minimization and Surfactant Recommendations

DRIFT CONTROL:

Appropriate drift control must be used with all herbicides when using the truck handgun, fixture or Flex-5 booms. Drift control is not required when using backpack sprayers.

THE OPERATOR, HOWEVER, MUST ALWAYS ENSURE THAT THE HERBICIDE IS BEING PLACED ON TARGET REGARDLESS OF THE METHOD OF APPLICATION. IF WIND CONDITIONS ARE SUCH THAT THE SPRAY CANNOT BE KEPT ON TARGET, THE OPERATOR MUST CEASE SPRAY OPERATIONS.

Control WM™ drift control should be shaken thoroughly, then slowly injected into the system, using the integrated drift control injector. Addition of Control WM™ drift control through the main tank lid is not recommended.

The Control WM™ drift control rate is 2 fluid ounces per 100 Gallons of Water.

Droplex® drift control can be added through the main tank lid or the conical tank.

The Droplex® drift control rate is 10 ounces per acre for non-aquatic applications and 6 ounces per acre for aquatic applications.

SURFACTANT:

A surfactant is required when using Approved Aquatic Herbicide, Escort® XP, Capstone® and Transline® when spraying Mesquite and Huisache.

The surfactant rate for Escort® XP is 1 quart per 100 gallons of water. When making an overspray application to Bastard Cabbage, using Escort® XP, 1 quart of MSO per 100 gallons of water should be used instead of a non-ionic surfactant.

The surfactant rate for Approved Aquatic Herbicide is 2 quarts per 100 gallons of water.

The surfactant rate for Transline® is 2 quarts per 100 gallons of water when spraying Mesquite and Huisache.

The surfactant rate for Vista® XRT is 2 quarts per 100 gallons of water when spraying Giant Ragweed.

The surfactant rate for Outrider® is 1 quart per 100 gallons of water when spraying Johnsongrass by itself.

The surfactant rate for Target® 6.6 is 2 quarts per 100 gallons of water when spraying Johnsongrass.
Handgun/Backpack Calibration

**Method A:**
- Fill the handgun with clean water.
- With a watch or stopwatch, time how long it takes to uniformly spray an area of 18½ feet by 18½ feet.
- Using the recorded time, spray again into a measuring device. The fluid ounces collected will equal the Gallons Per Acre (GPA).

**Method B:**
- Fill the handgun with clean water up to a specific marked level.
- Uniformly spray an area of 18½ feet by 18½ feet.
- Measure how many fluid ounces it takes to fill the sprayer back up to the marked level.
- The fluid ounces sprayed out will equal the Gallons Per Acre (GPA).

If the operator does not calibrate the handgun using either of these methods, then use an estimated rate of 100 GPA.

Fixture Boom Schematic

**Inside 110-20 or Turbo-Drop** - Sprays vegetation in shoulder

**Middle 110-20 or Turbo-Drop** - Sprays vegetation in shoulder

**Edge 110-20 or Turbo-Drop** - Sprays vegetation in edge of pavement

**OC08** - Sprays vegetation under guardrails

**Outside 6508** - Sprays vegetation around sign posts, delineators, behind guardrail

**Outside 2508** - Sprays vegetation around sign posts, delineators, behind guardrail
How to Calibrate Turbo Drops

**Step 1:** Select the nozzles you know you will be using for your application

**Step 2:** With drift control in the main tank, collect the fluid out of each nozzle selected for a period of 60 seconds and record the volume in fluid ounces

**Step 3:** Record the spray width of the selected nozzles.

**Step 4:** Do the math.

---

**Step 1:** Select the nozzles you know you will be using for your application

**Step 2:** With drift control in the main tank, collect the fluid out of each nozzle selected for a period of 60 seconds and record the volume in fluid ounces

**Step 3:** Record the spray width of the selected nozzles.

**Step 4:** Do the math.

---

85 +
110 +
90 =

---

**285 Fl Oz / Minute**

285 divided by 128 fl oz per gallon = **2.2 GPM**

Now, plug these numbers into the Formula:

---

**2.2**

---

**5940 x 2.2 GPM**

---

**MPH x SW”**

---

**74**

---

85
110
90

---

74”
\[ \text{GPA} = \frac{5940 \times \text{GPM}}{\text{MPH} \times \text{SW}'} \]

\[ \text{GPA} = \frac{5940 \times 2.2}{13,068} \]

\[ \begin{align*}
\text{Regular Nozzles} & \quad 5 \times 74 \\
\text{or Turbo-Drop} & \quad 10 \times 74
\end{align*} \]

\[ \begin{align*}
\text{Regular Nozzles} & \quad 370 \\
\text{or Turbo-Drop} & \quad 740
\end{align*} \]
**Example 1:** Tank mix a 300-gallon load of Roundup PROMAX® and Esplanade® 200 SC for complete control (bare ground) along the edge of pavement with *Turbo-Drop* nozzles.

**Step 1:** Determine the number of acres you can spray:

\[
\frac{300 \text{ Gal}}{18 \text{ GPA}} = 16.7 \text{ Ac}
\]

**Step 2:** Determine the proper amount of Roundup PROMAX® and Esplanade® 200 SC to add:

\[
\begin{align*}
16.7 \text{ Ac} \times 3 \text{ Qt. / Ac} &= 50.1 \text{ Qts.} \\
16.7 \text{ Ac} \times 4 \text{ Oz. / Ac} &= 66.8 \text{ Oz.}
\end{align*}
\]

**Step 3:** Determine the proper amount of drift control to add:

\[
3 \times 2 \text{ Oz. / 100 Gal} = 6 \text{ fl Oz.}
\]

**Drive the Proper Speed!**

10 mph *Turbo-Drop*
Example 2: Tank mix a 1,000 gallon solution of Roundup PROMAX® + Escort® XP + Outrider® for Johnsongrass control, using your Flex-5 spray head:

Step 1: Determine the number of acres you can spray:

\[
\text{1000 Gal} \quad \text{_________} \quad 25 \text{ GPA} = 40 \text{ Ac}
\]

Step 2: Determine the proper amount of chemical to add:

\[
\begin{align*}
40 \text{ Ac} \times 8 \text{ Oz.} / \text{Ac} &= 320 \text{ Oz} / 32 = 10 \text{ Qts.} \\
40 \text{ Ac} \times 1 \text{ Oz.} / \text{Ac} &= 40 \text{ Oz.} \\
40 \text{ Ac} \times 1.33 \text{ Oz.} / \text{Ac} &= 53 \text{ Oz.}
\end{align*}
\]

Step 3: Determine the proper amount of drift control to add:

\[
\begin{align*}
1000 \div 100 &= 10 \\
10 \times 2 \text{ Oz.} &= 20 \text{ fl Oz.}
\end{align*}
\]

Drive the Proper Speed! (11.36 mph)

Calibration Summary

- Calibrate your Turbo-Drop Nozzles at least **ANNUALLY.**
- Record your Calibration Numbers on your **RECORD BOOK.**
- Calibrate the Nozzle **Combinations you Normally Use** (could be more than one combination).
- If you’re not sure what your Nozzles are Spraying, **CALIBRATE THEM before you spray any chemical.**
- The **FLEX - 5 Spray Boom** has been Pre-Calibrated To **25 GPA.**
### Timing of Herbicide Operations

#### General Information

The time of the year that herbicides are applied is very important. Herbicide application timing affects how well the treatment will control the weed problem for which it is directed without causing damage to desirable vegetation on the right-of-way. The herbicide application for weed control must also be applied at a time of the year so that it does not affect the establishment and propagation of wildflowers.

The following table outlines the recommended time of the year when herbicide operations should occur.

<table>
<thead>
<tr>
<th>Herbicide Operations</th>
<th>Targeted Plants</th>
<th>Application Months</th>
</tr>
</thead>
<tbody>
<tr>
<td>Edge of Pavement/Guardrails</td>
<td>Bermudagrass</td>
<td>March – October</td>
</tr>
<tr>
<td>Broadcast Applications</td>
<td>Johnsongrass and Broadleaf Weeds</td>
<td>April – October</td>
</tr>
<tr>
<td>Rip-rap, Medians, Gores and Retaining Walls</td>
<td>All Vegetation</td>
<td>Year Round</td>
</tr>
<tr>
<td>Other Noxious Weeds</td>
<td>Field Bindweed, Giant Ragweed, Sunflowers, Georgia Cane, Musk Thistle, African Rue</td>
<td>June - October</td>
</tr>
<tr>
<td>Chemical Pruning/ Side-Trimming</td>
<td>Trees and Brush</td>
<td>Sept-October</td>
</tr>
<tr>
<td>Trees and Brush</td>
<td>Mesquite, Huisache, Retama</td>
<td>June – October</td>
</tr>
<tr>
<td><strong>Pathfinder® II</strong></td>
<td>Cut Stumps/Trees and Brush</td>
<td>Year-round (as long as ground is not frozen)</td>
</tr>
<tr>
<td>Aquatic Weeds</td>
<td>Cattails</td>
<td>April - October</td>
</tr>
</tbody>
</table>

Remember: Depending on where you are located in the state, your application month may differ. With the exemption of **Pathfinder® II**, the herbicides used in the TxDOT Vegetation Management Program should be used when plants are actively growing. A vibrant green plant leaf is a good indication that a plant is "actively growing." Young plants are easier to control than mature plants. This is generally because older plants have thicker leaf surface coating and more extensive root systems with energy savers.
# Quick Reference Table

<table>
<thead>
<tr>
<th>Target/Type of Control Desired</th>
<th>Herbicide</th>
<th>Application Rate</th>
<th>Optimum Treatment Period</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Guardrails, delineators, mailboxes, signage (removal of tall weeds)</td>
<td>Roundup PROMAX® + Escort® XP + Outrider®</td>
<td>8 ounces + 1 ounce + 1.33 ounces/acre</td>
<td>Apply after wildflowers seed &amp; before July 31st.</td>
<td>Vista® XRT at the rate of 10 ounces per acre can be combined with the three-way or two-way mixtures for the control of Giant Ragweed. Complete control (bare ground) beneath guardrails, under delineators, and around sign supports is not recommended.</td>
</tr>
<tr>
<td>Guardrails, delineators, mailboxes, signage (removal of tall weeds)</td>
<td>Roundup PROMAX® + Outrider®</td>
<td>8 ounces + 1.33 ounces per acre</td>
<td>Can be applied until October 15th.</td>
<td></td>
</tr>
<tr>
<td>Edge of pavement, (bare ground edge of pavement application, no more than 6 inches from edge of road surface)</td>
<td>Roundup PROMAX® + EsplAnade® 200 SC</td>
<td>3 quarts per acre + 4 ounces per acre</td>
<td>March through October OR when there is green &amp; actively growing vegetation encroaching the pavement.</td>
<td>RoundUp PROMAX® (short-term control) is combined with 4 ounces of Esplanade® 200 SC (soil-residual control) to control vegetation in the Edge of Pavement.</td>
</tr>
<tr>
<td>Riprap, paved medians, raised medians and retaining walls (bare ground)</td>
<td>Roundup PROMAX®</td>
<td>3 quarts per acre</td>
<td>Overspray Operations with Flex-5 spray head</td>
<td></td>
</tr>
<tr>
<td>Riprap, paved medians, raised medians and retaining walls (bare ground)</td>
<td>EsplAnade® 200 SC + Roundup PROMAX®</td>
<td>4 ounces per 100 gallons of water + 6 quarts per 100 gallons of water</td>
<td>Apply while actively growing year-round.</td>
<td>Handgun Operations. Do not make applications of Esplanade® 200 SC if rain is forecasted within 48 hours of the application.</td>
</tr>
</tbody>
</table>
## Quick Reference Table (cont.)

<table>
<thead>
<tr>
<th>Target/Type of Control Desired</th>
<th>Herbicide</th>
<th>Application Rate</th>
<th>Optimum Treatment Period</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Johnsongrass Control</strong></td>
<td>Roundup PROMAX® + Outrider®</td>
<td>8 ounces + 1.33 ounces per acre</td>
<td>Early boot to early seedhead is a good time to make application. Apply while actively growing.</td>
<td>Flex-5. For use in Bahiagrass areas. Do not use Outrider® after October 15.</td>
</tr>
<tr>
<td></td>
<td>Outrider®</td>
<td>1.33 ounces per acre + 1 quart Surfactant per 100 gallons of water</td>
<td>Flex-5. In areas where wildflowers are present or if brownout from RoundUP PROMAX® has been a problem. Do not use Outrider® after October 15.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Roundup PROMAX®</td>
<td>2 parts water, 1 part RUPM OR 33% solution</td>
<td></td>
<td>Handgun application</td>
</tr>
<tr>
<td><strong>Johnsongrass Control + Broadleaves (3-Way Mix)</strong></td>
<td>Roundup PROMAX® + Escort® XP + Outrider®</td>
<td>8 ounces + 1 ounce + 1.33 ounces per acre</td>
<td>Early boot to early seedhead is a good time to make application. Apply while actively growing.</td>
<td>Overspray Operations/Flex-5 Spray Head Vista® XRT at 10 oz per acre may be substituted for Escort XP® in Bahiagrass ROW. If after July 31, do not apply Escort XP®, or Vista® XRT, as a broadcast application in the ROW. Spot treat problem areas using the Flex-5.</td>
</tr>
<tr>
<td><strong>Johnsongrass Control + Broadleaves (4-Way Mix)</strong></td>
<td>Roundup PROMAX® + Escort® XP + Outrider® + Vista XRT®</td>
<td>8 ounces + 1 ounce + 1.33 ounces + 10 ounces per acre</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Hard-to-Control Johnsongrass</strong></td>
<td>Target 6.6®</td>
<td>1.5 quarts per acre + 2 quarts of surfactant per 100 gallons of water</td>
<td></td>
<td>Overspray application. Temp needs to be at least 70°. Two applications, 30-60 days apart are needed; as long as Johnsongrass is green and actively growing.</td>
</tr>
</tbody>
</table>
## Quick Reference Table (cont.)

<table>
<thead>
<tr>
<th>Target/Type of Control Desired</th>
<th>Herbicide</th>
<th>Application Rate</th>
<th>Optimum Treatment Period</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Switchgrass</td>
<td>Target® 6.6</td>
<td>1.5 quarts per acre + 2 quarts of surfactant per 100 gallons of water</td>
<td>2 pints per 100 gallons of water + 2 quarts of surfactant per 100 gallons of water</td>
<td>Overspray operations with Flex-5 boom. Temp needs to be at least 70º. Two applications, 30-60 days apart are needed, as long as, switchgrass is green and actively growing.</td>
</tr>
<tr>
<td></td>
<td>Roundup PROMAX®</td>
<td>6 quarts per 100 gallons of water + 2 quarts of surfactant per 100 gallons of water</td>
<td>Apply while actively growing</td>
<td>Handgun operations. Spot treatment during growing season.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 parts water, 1 part RUPM OR 33% solution</td>
<td></td>
<td>Rotowiper®/Ropewick application</td>
</tr>
<tr>
<td>Guinea Grass</td>
<td>Roundup PROMAX®</td>
<td>6 quarts per 100 gallons of water (1.5% solution)</td>
<td>Apply while actively growing</td>
<td>Spot treat with handgun during growing season</td>
</tr>
<tr>
<td></td>
<td></td>
<td>16 ounces per acre</td>
<td></td>
<td>Overspray operations with Flex-5 boom.</td>
</tr>
<tr>
<td>Perennial Ryegrass</td>
<td>Roundup PROMAX®</td>
<td>20 ounces per acre</td>
<td>Late March</td>
<td>Overspray application with Flex-5</td>
</tr>
<tr>
<td>Wildoats or Jointed Goatgrass</td>
<td>Roundup PROMAX®</td>
<td>10 ounces per acre</td>
<td>Late March</td>
<td>Spray before seed mature</td>
</tr>
<tr>
<td>Giant Ragweed (Bloodweed)</td>
<td>Vista® XRT</td>
<td>10 fluid ounces per acre + 2 quarts surfactant per 100 gallons of water</td>
<td>Late Spring / Early Summer</td>
<td>Overspray operations with Flex-5 boom. Apply before plants mature. Do not use Vista® XRT in the ROW after July 31st as overspray application.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10 fluid ounces per acre + 2 quarts surfactant per 100 gallons of water</td>
<td></td>
<td>Handgun operations</td>
</tr>
<tr>
<td>Kochia</td>
<td>Vista® XRT</td>
<td>10 fluid ounces per acre + surfactant at the rate of 2 quarts per 100 gallons of water</td>
<td>When vegetation is actively growing</td>
<td>Handgun operations. Add surfactant at the rate of 2 quarts per 100 gallons of water.</td>
</tr>
<tr>
<td>Target/Type of Control Desired</td>
<td>Herbicide</td>
<td>Application Rate</td>
<td>Optimum Treatment Period</td>
<td>Comments</td>
</tr>
<tr>
<td>-------------------------------</td>
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</tr>
<tr>
<td>Russian Thistle</td>
<td>Vista XRT® + Escort® XP</td>
<td>10 fluid ounces per acre + 1 ounce per acre + 2 quarts of surfactant per 100 gallons of water</td>
<td>When vegetation is actively growing</td>
<td>Flex-5 boom. Do not use Vista® XRT or Escort® XP in the ROW after July 31st as overspray application.</td>
</tr>
<tr>
<td>Cactus</td>
<td>Vista® XRT</td>
<td>0.5% solution</td>
<td>Make application in the evening</td>
<td>Handgun Application. Cactus grow and die slowly. Cactus open their stomata at night to breathe, so evening application is best.</td>
</tr>
<tr>
<td>Sunflower</td>
<td>Transline®</td>
<td>10 fluid ounces per acre + 2 quarts per 100 gallons of surfactant</td>
<td>Late Spring / Early Summer</td>
<td>Overspray operations with Flex-5 boom. Apply before plants mature. Do not use Transline® after July 31 as overspray application on broadleaf plants.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10 ounces per 100 gallons + 2 quarts per 100 gallons of surfactant</td>
<td></td>
<td>Handgun operations</td>
</tr>
<tr>
<td>Musk Thistle</td>
<td>Transline®</td>
<td>10 fluid ounces per acre + 2 quarts per 100 gallons of surfactant</td>
<td>Early Spring</td>
<td>Overspray operations with Flex-5 boom. Do not use Transline® after July 31 as an overspray application for broadleaves.</td>
</tr>
<tr>
<td>Mesquite &amp; Huisache</td>
<td>Transline®</td>
<td>21 ounces per acre + 2 quarts surfactant per 100 gallons of water</td>
<td>Mid-Summer / Early Fall</td>
<td>Overspray operations with Flex-5 boom. Do not use Transline® after October 15 as an overspray application for brush control.</td>
</tr>
<tr>
<td>Mesquite &amp; Huisache, Low Volume Foliar Spray</td>
<td>Transline®</td>
<td>21 ounces per 100 gallons + 2 qts. surfactant per 100 gallons of water</td>
<td>Mid-Summer / Early Fall</td>
<td>Handgun operation. If using handwand with 25-50 gal poly tank, use low volume X-6 tip.</td>
</tr>
<tr>
<td>Target/Type of Control Desired</td>
<td>Herbicide</td>
<td>Application Rate</td>
<td>Optimum Treatment Period</td>
<td>Comments</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>-----------------</td>
<td>----------------------------------------------------------------------------------</td>
<td>---------------------------</td>
<td>---------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Kudzu ***</td>
<td>Transline®</td>
<td>2 quarts per 100 gallons + 2 quarts surfactant per 100 gallons of water</td>
<td>When vegetation is actively growing.</td>
<td>Handgun operation</td>
</tr>
<tr>
<td>***Please Note: Transline® at 21 ounces/acre is the maximum use rate per year. Kudzu is a very aggressive vine and additional treatments will need to be planned and scheduled for future years to gain total eradication of this noxious weed.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bastard Cabbage</td>
<td>Escort® XP</td>
<td>2 ounces per acre + 1 quart of MSO per 100 gallons of water</td>
<td>October-March</td>
<td>Overspray application. MSO allows the application speed to remain 11.4 mph. Spray rosettes before flowing.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4 ounces per 100 gallons of water + 1 quart surfactant per 100 gallons of water</td>
<td></td>
<td>Handgun operation. Spray rosettes before flowering. Rosettes are easier to see after Fall mowing.</td>
</tr>
<tr>
<td>Wooly Sunflower</td>
<td>Escort® XP</td>
<td>2 ounces per acre +1 quart of MSO per 100 gallons of water</td>
<td>June-September</td>
<td>Overspray application. Spray before plants mature. Use MSO to maintain 11.4 mph spray speed.</td>
</tr>
<tr>
<td>Morning Glory Vine</td>
<td>Escort® XP</td>
<td>2 ounces per acre + 1 quart of surfactant per 100 gallons of water</td>
<td>June-September</td>
<td>Overspray application to Cable Fence. Always add 1 quart of surfactant per 100 gallons of water.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 ounce per acre + 1 quart of surfactant per 100 gallons of water</td>
<td></td>
<td>Overspray application into the ROW for broadleaves. Always add 1 quart of surfactant per 100 gallons of water.</td>
</tr>
<tr>
<td>Field Bindweed</td>
<td>Escort® XP</td>
<td>1 ounce per acre + 1 quart of surfactant per 100 gallons of water</td>
<td>June-September</td>
<td></td>
</tr>
<tr>
<td>Common Sunflower</td>
<td></td>
<td>1 ounce per acre + 1 quart of surfactant per 100 gallons of water</td>
<td>Spray when 18”-2’ feet in height.</td>
<td>Add surfactant at the rate of 1 quart/100 gallons of water if using without Roundup PROMAX®, If after July 31, do not apply Escort® XP as a broadcast application in the ROW. Spot treat problem areas only using the Flex-5 or handgun.</td>
</tr>
<tr>
<td>Western Bitterweed</td>
<td></td>
<td>1 ounce per acre + 1 quart of surfactant per 100 gallons of water</td>
<td>March-April</td>
<td></td>
</tr>
<tr>
<td>Turnip Weed</td>
<td></td>
<td>1 ounce per acre + 1 quart of surfactant per 100 gallons of water</td>
<td>February-March</td>
<td></td>
</tr>
<tr>
<td>African Rue</td>
<td></td>
<td>3 ounces per acre + 1 quart of surfactant per 100 gallons of water</td>
<td>April-September</td>
<td></td>
</tr>
<tr>
<td>Other Broadleaf Weeds</td>
<td></td>
<td>1 ounce per acre + 1 quart of surfactant per 100 gallons of water</td>
<td>May-July 31</td>
<td>Do not use Escort® XP after July 31st as broadcast application.</td>
</tr>
</tbody>
</table>
### Quick Reference Table (cont.)

<table>
<thead>
<tr>
<th>Target/Type of Control Desired</th>
<th>Herbicide</th>
<th>Application Rate</th>
<th>Optimum Treatment Period</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemical Pruning (overhanging trees and brush encroaching on right-of-way or covering roadway signage)</td>
<td>Capstone®</td>
<td>6 pints per acre + 2 quarts surfactant per 100 gallons of water</td>
<td>When vegetation is actively growing</td>
<td>Overspray operations with Flex-5 boom before trees lose their leaves.</td>
</tr>
<tr>
<td>Chemical Pruning in areas where there is underbrush and Hackberry trees</td>
<td>Capstone® + Vista® XRT</td>
<td>6 pints per acre + 10 ounces per acre + 2 quarts surfactant per 100 gallons of water</td>
<td>When vegetation is actively growing</td>
<td>Overspray operations with Flex-5 boom.</td>
</tr>
<tr>
<td>Chemical Pruning in Aquatic Areas (Standing or Running Water)</td>
<td>Vastlan®</td>
<td>1 gallon per acre + 2 quarts surfactant per 100 gallons of water</td>
<td>When vegetation is actively growing</td>
<td>Overspray operations with Flex-5 boom.</td>
</tr>
<tr>
<td>Georgia Cane/Arundo Cane/Giant Reed or Cattails</td>
<td>Approved Aquatic Herbicide (54% Glyphosate)</td>
<td>8 quarts per 100 gallons + 2 quarts surfactant per 100 gallons of water</td>
<td>September - October</td>
<td>Handgun operation</td>
</tr>
<tr>
<td>Georgia Cane/Arundo Cane</td>
<td>Imox™ &amp; Approved Aquatic Herbicide (54%Glyphosate)</td>
<td>1.5% Imox + 2% Approved Aquatic + 2 quarts surfactant per 100 gallons of water</td>
<td>Make applications when cane is young and growing, usually early May.</td>
<td>Handgun operations. 10 MPH wind restriction. DO NOT apply if winds exceed 10 MPH.</td>
</tr>
<tr>
<td>Aquatic Vegetation (standing or running water present)</td>
<td>Approved Aquatic Herbicide (54% Glyphosate)</td>
<td>8 quarts per 100 gallons of water + 2 quarts surfactant per 100 gallons of water</td>
<td>When vegetation is actively growing</td>
<td>Handgun operations. Add surfactant at the rate of 2 quarts per 100 gallons of water.</td>
</tr>
<tr>
<td>Aquatic Vegetation (standing or running water present)</td>
<td>Approved Aquatic Herbicide (54% Glyphosate)</td>
<td>3.75 quarts per acre + 2 quarts surfactant per 100 gallons of water</td>
<td>September - October</td>
<td>Overspray operations with Flex-5 boom. Add surfactant at the rate of 2 quarts per 100 gallons of water and appropriate amount of Drift Control.</td>
</tr>
<tr>
<td>Brush * (Mesquite, Huisache, etc)</td>
<td>Pathfinder® II</td>
<td>2.5 gallons per acre. See page 1 to calculate Pathfinder® II area sprayed when less than 2.5 gallons is used.</td>
<td>Year Around (as long as ground is NOT frozen)</td>
<td>Basal Bark Treatment Cone Jet #5500 X2 nozzle required. Spray lower 12”-15” of stem. Complete coverage required. Do not spray to the point of runoff. Do not use Pathfinder® II as a foliar application.</td>
</tr>
</tbody>
</table>

*Optional Basal Bark and cut stump applications with Pathfinder® II can be used at any time during the year, as long as ground is not frozen.
## District Bareground Policies

<table>
<thead>
<tr>
<th>District Name</th>
<th>District Number</th>
<th>Maximum Edge Width (inches)</th>
<th>Guardrail Policy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paris</td>
<td>1</td>
<td>6-10&quot;</td>
<td>Bareground in most areas</td>
</tr>
<tr>
<td>Fort Worth</td>
<td>2</td>
<td>6&quot;</td>
<td>No bareground</td>
</tr>
<tr>
<td>Wichita Falls</td>
<td>3</td>
<td>6&quot;</td>
<td>Bareground only on guardrails with concrete mow strips</td>
</tr>
<tr>
<td>Amarillo</td>
<td>4</td>
<td>0&quot; (only to edge of shoulder)</td>
<td>Bareground</td>
</tr>
<tr>
<td>Lubbock</td>
<td>5</td>
<td>6&quot;</td>
<td>Check with AE on bareground/ no bareground</td>
</tr>
<tr>
<td>Odessa</td>
<td>6</td>
<td>6&quot;</td>
<td>Bareground</td>
</tr>
<tr>
<td>San Angelo</td>
<td>7</td>
<td>6&quot;</td>
<td>No bareground</td>
</tr>
<tr>
<td>Abilene</td>
<td>8</td>
<td>6&quot; maximum, prefer 4&quot; or less</td>
<td>Bareground up to 1&quot; behind guardrail</td>
</tr>
<tr>
<td>Waco</td>
<td>9</td>
<td>6&quot;</td>
<td>Bareground</td>
</tr>
<tr>
<td>Tyler</td>
<td>10</td>
<td>6&quot; maximum, 3&quot; preferred</td>
<td>Bareground</td>
</tr>
<tr>
<td>Lufkin</td>
<td>11</td>
<td>6&quot;</td>
<td>Bareground</td>
</tr>
<tr>
<td>Houston</td>
<td>12</td>
<td>6&quot;</td>
<td>Bareground only on guardrails with concrete mow strips, 12&quot; behind guardrail</td>
</tr>
<tr>
<td>Yoakum</td>
<td>13</td>
<td>6&quot;</td>
<td>Bareground</td>
</tr>
<tr>
<td>Austin</td>
<td>14</td>
<td>6-12&quot;</td>
<td>No bareground</td>
</tr>
<tr>
<td>San Antonio</td>
<td>15</td>
<td>6&quot;</td>
<td>Only on improved guardrails with asphalt bases.</td>
</tr>
<tr>
<td>Corpus Christi</td>
<td>16</td>
<td>6&quot;</td>
<td>No bareground</td>
</tr>
<tr>
<td>Bryan</td>
<td>17</td>
<td>6&quot;</td>
<td>Bareground under guardrails but not around fixtures</td>
</tr>
<tr>
<td>Dallas</td>
<td>18</td>
<td>6&quot;</td>
<td>Bareground</td>
</tr>
<tr>
<td>Atlanta</td>
<td>19</td>
<td>6&quot;</td>
<td>No bareground</td>
</tr>
<tr>
<td>Beaumont</td>
<td>20</td>
<td>10&quot; max / 6&quot; recommended</td>
<td>No bareground</td>
</tr>
<tr>
<td>Pharr</td>
<td>21</td>
<td>6-10&quot;</td>
<td>No bareground</td>
</tr>
<tr>
<td>Laredo</td>
<td>22</td>
<td>6&quot;</td>
<td>No bareground</td>
</tr>
<tr>
<td>Brownwood</td>
<td>23</td>
<td>6&quot;</td>
<td>Bareground only under metal beam guardfence (MBGF)</td>
</tr>
<tr>
<td>El Paso</td>
<td>24</td>
<td>6&quot;</td>
<td>Bareground</td>
</tr>
<tr>
<td>Childress</td>
<td>25</td>
<td>6-8&quot;</td>
<td>No bareground</td>
</tr>
</tbody>
</table>
## Herbicide Half-Life and Wait to Spray Times

<table>
<thead>
<tr>
<th>Herbicide</th>
<th>Half-Life of Herbicide in Contact with Soil</th>
<th>Half-Life of Herbicide in Water @ 105°F or Above</th>
<th>Annual not to Exceed Rates</th>
<th>Visual Effects of Wilting after Application</th>
<th>Time Required Prior to Rainfall after Application</th>
<th>Formulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bayer Roundup PROMAX®</td>
<td>0 Days</td>
<td>Indefinite, if solution is mixed in clean, pure water. Very short life if water is high in pH or dirty.</td>
<td>7 quarts per acre</td>
<td>Annual Plants 2-4 days and Perennial 7 days or more</td>
<td>0.5 hours</td>
<td>Potassium Salt Glyphosate with Surfactant, Water Soluble Liquid</td>
</tr>
<tr>
<td>Valent Outrider®</td>
<td>28 Days</td>
<td>16 days if pH is at 7.</td>
<td>2.66 ounces per acre</td>
<td>2-3 weeks &amp; 4-6 weeks</td>
<td>1-2 hours</td>
<td>Sultosulfuron Dispersible Granules</td>
</tr>
<tr>
<td>Approved Aquatic Herbicide, Aquamaster®, Roundup Custom® or Rodeo®</td>
<td>0 Days</td>
<td>Indefinite, if solution is mixed in clean, pure water. Very short life if water is high in pH or dirty.</td>
<td>8 quarts per acre</td>
<td>Annual Plants 2-4 days and Perennial 7 days or more</td>
<td>6 hours</td>
<td>Glyphosate without Surfactant, Water Soluble Liquid</td>
</tr>
<tr>
<td>Bayer Escort® XP</td>
<td>20 Days</td>
<td>12-15 days if pH is at 7. More days if pH is higher and less days if pH is lower.</td>
<td>4 ounces per acre</td>
<td>2-4 weeks &amp; 4-6 weeks</td>
<td>1-2 hours</td>
<td>Metsulfuron Methyl, Dispersible Granules</td>
</tr>
<tr>
<td>Corteva Transline®</td>
<td>23 Days</td>
<td>30 days at pH range of 5-9 at 77°F. Would not expect this to be significantly different at 105°F +</td>
<td>21 ounces per acre</td>
<td>1 hour</td>
<td>0.5 hours</td>
<td>Clopyralid, Liquid Concentrate</td>
</tr>
<tr>
<td>Corteva Vastlan®</td>
<td>30 Days</td>
<td>About one day</td>
<td>2.25 gallons per acre</td>
<td>2-3 days of more</td>
<td>2 hours</td>
<td>Triclopyr Choline</td>
</tr>
<tr>
<td>Herbicide Half-Life and Wait to Spray Times (cont.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-----------------------------------------------</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Herbicide</strong></td>
<td><strong>Half-Life of Herbicide in Contact with Soil</strong></td>
<td><strong>Half-Life of Herbicide in Water @ 105°F or Above</strong></td>
<td><strong>Annual not to Exceed Rates</strong></td>
<td><strong>Visual Effects of Wilting after Application</strong></td>
<td><strong>Time Required Prior to Rainfall after Application</strong></td>
<td><strong>Formulation</strong></td>
</tr>
<tr>
<td>Corteva Pathfinder II®</td>
<td>28 Days</td>
<td>Does not mix with water</td>
<td>10.7 gallons per acre</td>
<td>2-3 days or more</td>
<td>.5 hours</td>
<td>Triclopyr, Ready to use Liquid</td>
</tr>
<tr>
<td>Corteva Vista® XRT</td>
<td>14 Days</td>
<td>185 days @ 68°F. Would not expect this to be significantly different at 105°F +</td>
<td>23 ounces per acre</td>
<td>1 day</td>
<td>1 hour</td>
<td>Fluroxypyr, Liquid Concentrate</td>
</tr>
<tr>
<td>Corteva Capstone®</td>
<td>34.5 days, Aminopyralid 30 days</td>
<td>(When in solution in spray tank) stable to hydrolysis, photodegrades in water in sunlight through UV (spray tanks have UV protection)</td>
<td>9 pints per acre</td>
<td>Varies with the species, can be from 6 to 48 hours, or on Russian knapweed can be as long as 3 months</td>
<td>No recommendation but 2-6 hours might be good</td>
<td>Aminopyralid and Triclopyr, Liquid Concentrate</td>
</tr>
<tr>
<td>Bayer EsplAnade® 200 SC</td>
<td>9-66 Days</td>
<td>Less than 5 days in clear, shallow water</td>
<td>10 ounces per acre</td>
<td>3-5 Days after germination/emergence</td>
<td>2 hours</td>
<td>Indaziflam, Liquid Concentrate</td>
</tr>
<tr>
<td>Luxembourg-Pamal Target® 6.6</td>
<td>245 Days</td>
<td>35 Days. Do not use near water.</td>
<td>12 pints per acre</td>
<td>2-3 days</td>
<td>6-8 hours</td>
<td>Monosodium methanearsonate - <strong>MSMA</strong> Liquid Concentrate</td>
</tr>
<tr>
<td>Imox™</td>
<td>20 Days</td>
<td>12 Days</td>
<td>5 gallons per acre = Handgun &amp; 1 gallon per acre per year overspray.</td>
<td>Over several weeks</td>
<td>1 hour</td>
<td>Imazamox, Liquid Concentrate</td>
</tr>
</tbody>
</table>
## Useful Conversion Factors

<table>
<thead>
<tr>
<th>Multiply</th>
<th>By</th>
<th>To Get</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acres</td>
<td>0.404</td>
<td>Hectares (ha)</td>
</tr>
<tr>
<td>Acres</td>
<td>4046.9</td>
<td>Square Meters (m2)</td>
</tr>
<tr>
<td>Cubic Yards</td>
<td>0.765</td>
<td>Cubic Meters (m3)</td>
</tr>
<tr>
<td>Cubic Feet</td>
<td>28.317</td>
<td>Liters (L)</td>
</tr>
<tr>
<td>Cups</td>
<td>0.237</td>
<td>Liters (L)</td>
</tr>
<tr>
<td>Feet</td>
<td>0.305</td>
<td>Meters (m)</td>
</tr>
<tr>
<td>Feet per Second</td>
<td>1.097</td>
<td>Kilometers per Hour (km/h)</td>
</tr>
<tr>
<td>Gallons</td>
<td>3.785</td>
<td>Liters (L)</td>
</tr>
<tr>
<td>Gallons per Square Foot</td>
<td>41.132</td>
<td>Liters per Square Meter (L/m2)</td>
</tr>
<tr>
<td>Gallons per Square Yard</td>
<td>4.527</td>
<td>Liters per Square Meter (L/m2)</td>
</tr>
<tr>
<td>Gallons per Acre</td>
<td>9.369</td>
<td>Liters per Hectare (L/ha)</td>
</tr>
<tr>
<td>Inches</td>
<td>2.54</td>
<td>Centimeters (cm)</td>
</tr>
<tr>
<td>Inches</td>
<td>25.4</td>
<td>Millimeters (mm)</td>
</tr>
<tr>
<td>Miles</td>
<td>1.609</td>
<td>Kilometers (km)</td>
</tr>
<tr>
<td>Miles per Hour</td>
<td>1.609</td>
<td>Kilometers per Hour (km/h)</td>
</tr>
<tr>
<td>Ounces (mass)</td>
<td>28.35</td>
<td>Grams (g)</td>
</tr>
<tr>
<td>Ounces (fluid)</td>
<td>29.573</td>
<td>Milliliters (mL)</td>
</tr>
</tbody>
</table>
### Useful Conversion Factors (cont.)

<table>
<thead>
<tr>
<th>Multiply</th>
<th>By</th>
<th>To Get</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ounces (fluid) / Sq. Ft.</td>
<td>41.132</td>
<td>Liters per Square Meter (L/m²)</td>
</tr>
<tr>
<td>Ounces (mass) / Acre</td>
<td>70.0</td>
<td>Grams per Hectare (g/ha)</td>
</tr>
<tr>
<td>Ounces (fluid) / Acre</td>
<td>73.0</td>
<td>Milliliters per Hectare (mL/ha)</td>
</tr>
<tr>
<td>Pints</td>
<td>0.473</td>
<td>Liters (L)</td>
</tr>
<tr>
<td>Pounds (mass)</td>
<td>0.454</td>
<td>Kilograms (kg)</td>
</tr>
<tr>
<td>Pounds (mass) / Gallon</td>
<td>0.12</td>
<td>Kilograms per Liter (kg/L)</td>
</tr>
<tr>
<td>Pounds (mass) / Cu. Ft.</td>
<td>16.018</td>
<td>Kilograms per Cu. Meter (kg/m²)</td>
</tr>
<tr>
<td>Pounds (mass) / Acre</td>
<td>1.121</td>
<td>Kilograms per Hectare (kg/ha)</td>
</tr>
<tr>
<td>Pounds (mass) / Sq. Ft.</td>
<td>4.883</td>
<td>Kilograms per Sq. Meter (kg/ha)</td>
</tr>
<tr>
<td>Pounds (force) / Sq. Inch</td>
<td>6.89</td>
<td>Kilopascals (kPa)</td>
</tr>
<tr>
<td>Pounds (force) / Sq. Ft.</td>
<td>47.88</td>
<td>Pascals (Pa)</td>
</tr>
<tr>
<td>Quarts per Acre</td>
<td>2.33</td>
<td>Liters per Hectare (L/ha)</td>
</tr>
<tr>
<td>Quarts</td>
<td>0.946</td>
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## Useful Conversion Factors (cont.)

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<td>Megagrams (Mg)</td>
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This publication is provided as a service to Texas Department of Agriculture customers and the citizens of the State of Texas. While the department has made every effort to ensure accuracy of this publication, it is not the official statutory or rules publication, and users rely on it entirely at their own risk. The Texas Administrative Code (West) and the Texas Agriculture Code (Vernon) are the official sources for Texas laws and regulations, and the Code of Federal Regulations is the source for the Worker Protection Standard. Therefore, the department makes no warranty, express or implied, or assumes any legal liability for the accuracy, completeness or usefulness of any information contained in this booklet. Please contact the Texas Department of Agriculture Pesticide Programs at 1-800-TELL-TDA (1-800-835-5832) if you have any questions regarding pesticide laws or regulations.
SUBCHAPTER A. GENERAL PROVISIONS

Sec. 76.001 | Definitions.

(1) **Active ingredient** means:

   (A) in the case of a pesticide other than a plant regulator, defoliant, or desiccant, an ingredient that prevents, destroys, repels, or mitigates a pest;

   (B) in the case of a plant regulator, an ingredient that through physiological action accelerates or retards the rate of growth or rate of maturation or otherwise alters the behavior of an ornamental or crop plant or the product of an ornamental or crop plant;

   (C) in the case of a defoliant, an ingredient that causes leaves or foliage to drop from a plant; or

   (D) in the case of a desiccant, an ingredient that artificially accelerates the drying of plant tissue.

(2) **Animal** means a vertebrate or invertebrate species, including man, other mammals, birds, fish, and shellfish.

(3) **Antidote** means a practical treatment used in preventing or lessening ill effects from poisoning, including first aid.

(4) **Application of a herbicide** means the spreading of a herbicide on real property having a continuous boundary line.

(5) **Defoliant** means a substance or mixture of substances intended to cause the leaves or foliage to drop from a plant, with or without causing abscission.

(6) **Department** means the Department of Agriculture.

(7) **Desiccant** means a substance or mixture of substances intended to artificially accelerate the drying of plant tissue.

(8) **Device** means an instrument or contrivance, other than a firearm, that is used to trap, destroy, repel, or mitigate a pest or other form of plant or animal life, other than man or a bacteria, virus, or other microorganism on or in living man or other living animals. The term does not include equipment sold separately from a pesticide.

(9) **Distribute** means offer for sale, hold for sale, sell, barter, or supply.

(10) **Environment** includes water, air, land, plants, man, and other animals living in or on water, air, or land, and the interrelationships that exist among them.

(11) **Equipment** means any type of ground, water, or aerial equipment or contrivance employing motorized, mechanical, or pressurized power and used to apply a pesticide to land or to anything that may be inhabiting or growing or stored on or in the land. The term does not include a pressurized hand-sized household apparatus used to apply a pesticide or any equipment or contrivance for which the person applying the pesticide is the source of power or energy used in making the pesticide application.
(12) **FIFRA** means the Federal Insecticide, Fungicide, and Rodenticide Act (7 U.S.C. Section 136 et seq.).

(13) **Fungus** means a non-chlorophyll-bearing thallophyte, including rust, smut, mildew, mold, yeast, or bacteria, but not including a non-chlorophyll-bearing thallophyte on or in living man or other living animals or on or in a processed food, beverage, or pharmaceutical.

(14) **Inert ingredient** means an ingredient that is not an active ingredient.

(15) **Insect** means any of the numerous small invertebrate animals generally having a segmented body and for the most part belonging to the class Insecta, comprising six-legged, usually winged forms such as beetles, bugs, bees, and flies. The term includes allied classes of arthropods, the members of which are wingless and usually have more than six legs, such as spiders, mites, ticks, centipedes, and wood lice.

(16) **Label** means the written, printed, or graphic matter on or attached to a pesticide or device or any of its containers or wrappers.

(17) **Labeling** means a label or any other written, printed, or graphic matter prepared by a registrant:

   (A) accompanying the pesticide or device at any time; or

   (B) to which reference is made on a label or in literature accompanying or referring to a pesticide or device, except accurate, nonmisleading references made to a current official publication of a federal or state institution or agency authorized by law to conduct research in the field of pesticides.

(18) **Land** means any land or water area, including airspace, and any plant, animal, structure, building, contrivance, or machinery, whether fixed or mobile, appurtenant to or situated on a land or water area or airspace, including any used for transportation.

(19) **License use category** means a classification of pesticide use based on the subject, method, or place of pesticide application.

(20) **Nematode** means an invertebrate animal of the phylum Nemathelminthes and class Nematoda (an unsegmented roundworm with an elongated, fusiform, or sac-like body covered with cuticle) inhabiting soil, water, plants, or plant parts.

(21) **Pesticide** means a substance or mixture of substances intended to prevent, destroy, repel, or mitigate any pest, or any substance or mixture of substances intended for use as a plant regulator, defoliant, or desiccant.

(22) **Plant regulator** means a substance or mixture of substances intended through physiological action to accelerate or retard the rate of growth or rate of maturation, or otherwise to alter the behavior of an ornamental or crop plant or the product of an ornamental or crop plant, but does not include a substance to the extent that it is intended as a plant nutrient, trace element, nutritional chemical, plant inoculant, or soil amendment.

(23) **Registrant** means a person who has registered a pesticide under this chapter.

(24) **Regulatory agency** means a state agency with responsibility for certifying applicators under Subchapter E of this chapter.
Restricted-use-pesticide means a pesticide classified as a restricted-use pesticide by the Environmental Protection Agency.

Thalophyte means a non-chlorophyll-bearing plant of a lower order than mosses and liverworts.

Weed means any plant that grows where not wanted.

Worker Protection Standard means the federal worker protection standard as found in the Code of Federal Regulations, 40 C.F.R. Parts 156 and 170.

Sec. 76.007 | Interagency Cooperation.

(a) The department shall be the lead agency for pesticide regulation in Texas. In cooperation with the U.S. Environmental Protection Agency or any federal agency responsible for implementation of federal pesticide law, the department shall:

1. register pesticides for use in Texas;
2. adopt lists of state-limited-use pesticides;
3. provide for training, certification, and licensure of all classes of pesticide applicators;
4. enforce pesticide laws and regulations governing the safe handling, use, storage, distribution, and disposal of pesticide products; and
5. adopt rules to carry out the provisions of this chapter.

SUBCHAPTER B. LABELING

Sec. 76.021 | Labeling Information.

(a) Each pesticide distributed in this state shall bear a label containing the following information relating to the pesticide:

1. the label information required by FIFRA, if the pesticide is subject to registration under that law; or
2. the following information, if the pesticide is not subject to registration under FIFRA:
   A. the name, brand, or trademark under which the pesticide is distributed;
   B. the name and percentage of each active ingredient and the total percentage of inert ingredients;
   C. directions for use that are necessary for effecting the purpose for which the product is intended and, if complied with, are adequate for the protection of health and the environment;
   D. if the pesticide contains any form of arsenic, the percentage of total water-soluble arsenic, calculated as elementary arsenic;
(E) the name and address of the manufacturer, registrant, or person for whom the pesticide was manufactured;

(F) numbers or other symbols to identify the lot or batch of the manufacturer of the contents of the package; and

(G) a clear display of appropriate warnings, symbols, and cautionary statements commensurate with the toxicity or use classification of the pesticide.

(b) The label bearing the ingredient statement under Subsection (a)(2)(B) of this section shall be on or attached to that part of the immediate container that is presented or displayed under customary conditions of purchase and, if the ingredient statement cannot be clearly read without removing the outer wrapping, on any outer container or wrapper of a retail package.

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**SUBCHAPTER C. REGISTRATION**

**Sec. 76.041 | Registration Required.**

(a) Except as provided by Subsection (b), (c), (d), or (e) of this section, before a pesticide is distributed in this state or is delivered for transportation or is transported in intrastate commerce or between points within this state through a point outside the state, it must be registered with the department. The manufacturer or other person whose name appears on the label of the pesticide shall register the pesticide.

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**SUBCHAPTER D. LICENSING OF DEALERS**

**Sec. 76.071 | License Required.**

(a) A person may not distribute in this state a restricted-use or state-limited-use pesticide or regulated herbicide without a valid current pesticide dealer license issued by the department.

(b) Except as otherwise provided by this section, a pesticide dealer must obtain a license for each location in the state that is used for distribution. If the person does not have a place of business in this state, the person may obtain one license for all out-of-state locations, but shall file as a condition to licensing a designation of an agent for service of process as provided by Section 76.042(d) of this code.

(c) A person must apply for a pesticide dealer license on forms prescribed by the department.

(d) A pesticide dealer may not distribute a restricted-use or state-limited-use pesticide or a regulated herbicide except to:

(1) a person licensed as a commercial applicator, noncommercial applicator, or private applicator;

(2) an individual working under the direct supervision of a licensed applicator;
(3) a certified private applicator;

(4) a licensed pesticide dealer; or

(5) a person who is licensed to practice veterinary medicine by the State Board of Veterinary Medical Examiners.

SUBCHAPTER E. USE AND APPLICATION

Sec. 76.101 | Coordination.

(a) The department is the lead agency in the regulation of pesticide use and application and is responsible for coordinating activities of state agencies, except as provided by Section 76.007(b) of this code and by Chapter 26 of the Water Code. The department shall submit a state plan for the licensing of pesticide applicators to the administrator of the Environmental Protection Agency.

(b) The department shall coordinate, plan, and approve training programs and shall use the public and private resources of this state, including state universities, colleges, junior colleges, community colleges, Texas Cooperative Extension, and the Texas Agricultural Experiment Station. The department and Texas Cooperative Extension shall adopt a memorandum of understanding to jointly coordinate, plan, and approve the training programs for private applicators.

Sec. 76.102 | Agencies Responsible for Licensing Pesticide Applicators.

(a) The department shall license pesticide applicators involved in the following license use categories:

(1) agricultural pest control, including animal pest control;

(2) forest pest control;

(3) ornamental and turf pest control, except as provided by Chapter 1951, Occupations Code;

(4) seed treatments;

(5) right-of-way pest control;

(6) regulatory pest control;

(7) aquatic pest control;

(8) demonstration pest control;

(9) health-related pest control; and

(10) other license use categories as necessary to comply with federal requirements. The department may not adopt license use categories that are designated by statute for regulation by another agency.
Sec. 76.104  |  Agency Rules for Application of a Pesticide.

(a) The head of each regulatory agency may, after notice and public hearing, adopt rules to carry out the provisions of this Subchapter for which the agency is responsible.

(b) Rules adopted under this section may:

(1) prescribe methods to be used in the application of a restricted-use or state-limited-use pesticide or regulated herbicide;

(2) relate to the time, place, manner, method, amount, or concentration of pesticide application or to the materials used in pesticide application; and

(3) restrict or prohibit use of a restricted-use or state-limited-use pesticide or regulated herbicide in designated areas during specific periods of time.

(c) A regulatory agency may adopt a rule under this section only after consideration of precautions or restrictions necessary to prevent unreasonable risk to man or the environment, taking into account the economic, social, and environmental costs and benefits of the use of the pesticide.

(d) The department shall adopt worker protection standards for pesticides if there is no federal worker protection standard. The department may adopt other rules for the protection of the health, safety, and welfare of farm workers and pesticide handlers.

Sec. 76.105  |  License Required.

(a) Except as provided by Section 76.003(e), a person may not purchase or use a restricted-use or state-limited-use pesticide or regulated herbicide unless the person is:

(1) licensed as a commercial applicator, noncommercial applicator, or private applicator and authorized by the license to purchase or use the restricted-use or state-limited-use pesticide or regulated herbicide in the license use categories covering the proposed pesticide use;

(2) an individual acting under the direct supervision of a licensed applicator, except as provided by Subsection (b) of this section and by Sections 76.003(e) and 76.116(f); or

(3) a certified private applicator as defined in Section 76.112(j) of this code.

(b) An individual is under the direct supervision of a licensed applicator if the individual is acting under the instructions and control of a licensed applicator who is responsible for the actions of the individual and who is available if and when needed. A licensed applicator may not supervise an applicator whose license or certificate is under suspension or revocation. The licensed applicator is not required to be physically present at the time and place of the pesticide application unless the label of the applied pesticide states that the presence of the licensed applicator is required.

(c) A licensed applicator is responsible for assuring that the person working under the licensee’s direct supervision is knowledgeable of the label requirements and rules and regulations governing the use of pesticides. A licensed applicator satisfies the requirements of this subsection if the person working under the licensee’s direct supervision has been trained as a handler under the federal worker protection standard.
Sec. 76.109 | Noncommercial Applicator License.

(a) A person who is required to be licensed under Section 76.105 of this code but who does not qualify as a commercial applicator or a private applicator shall apply to the appropriate regulatory agency for a noncommercial applicator license issued for the license use categories and subcategories in which the pesticide application is to be made.

(b) A person shall apply for an original or renewal noncommercial applicator license on forms prescribed by the regulatory agency. The applicant shall include with the application an annual license fee, as fixed by the governing body of or the head of the regulatory agency. The governing body of or the head of the regulatory agency may set other fees as necessary to defray the costs of administering a pesticide applicator certification program.

(c) The head of a regulatory agency may not issue an original noncommercial applicator license before the applicant has passed an examination under Section 76.110 of this code.

(d) An individual to whom a noncommercial applicator license is issued is authorized to purchase, use, and supervise the use of restricted-use and state-limited-use pesticides or regulated herbicides in the license use categories and subcategories in which the individual is licensed.

(d) If a license is issued in the name of a governmental entity, the entity must have a licensed applicator employed at all times. Failure to have a licensed applicator employed is a ground for revocation of a governmental entity noncommercial applicator license.

(e) As a condition to issuance of a noncommercial applicator license, an applicant located outside this state shall file with the regulatory agency a written instrument designating a resident agent for service of process in actions taken in the administration and enforcement of this chapter. Instead of designating a resident agent, the applicant may designate in writing the secretary of state as the recipient of service of process for the applicant in this state.

(f) An individual to whom a noncommercial applicator license is issued by the Texas Department of State Health Services is authorized to use and supervise the use of general-use, restricted-use, and state-limited-use pesticides in the license use categories and subcategories in which the individual is licensed.

(g) Neither this section nor any other law shall prohibit a political subdivision from reducing the number of hours of training or other requirements for an employee conducting larval mosquito control on property owned or controlled by the political subdivision using biological pesticides approved for general use by the Texas Department of State Health Services, provided the employee is given instructions adequate to ensure the safe and effective use of such pesticides.
Sec. 76.110 | Commercial and Noncommercial Applicator Examination; Reciprocal Agreements.

(a) Each person applying for a license as a commercial applicator or a noncommercial applicator must pass an examination demonstrating that the person:

(1) is properly qualified to perform functions associated with pesticide application to a degree directly related to the nature of the activity and the associated responsibility; and

(2) has knowledge of the use and effects of restricted-use and state-limited-use pesticides or regulated herbicides in the license use categories and subcategories in which the person is to be licensed.

Sec. 76.113 | Term and Renewal of Licenses.

(a) Each pesticide applicator license issued under this chapter, other than a private applicator license, expires at the end of the license period established by department rule.

(b) Each private applicator license is valid for five years.

(c) Except as provided by Subsection (d) of this section, a person having a valid license issued under this Subchapter may renew the license for another term without retesting by paying to the regulatory agency the license fee required by this Subchapter. A person who fails to apply for renewal of a license on or before the expiration date must pay, in addition to the annual license fee, the late fee provided by Section 12.024 of this code.

(d) A licensee must undertake training, submit to retesting, or both, before renewal of a license if the head of the agency determines that additional knowledge is required for renewal.

Sec. 76.114 | Records.

(a) A regulatory agency shall require each commercial and noncommercial applicator licensee to maintain records of all pesticide applications. The department may require each commercial or noncommercial applicator licensee to keep records of the licensee’s application of a specific restricted-use or state-limited-use pesticide or regulated herbicide and may require those records to be kept separate from other business records. The regulatory agency by rule shall prescribe the information to be entered into the records.

(b) Each private applicator shall maintain records of regulated herbicide and state-limited-use pesticide applications and shall maintain those records of restricted-use pesticide applications required by federal law.

(c) A licensee shall keep records required under this section for a period of two years from the date of the pesticide application. The licensee shall keep these records accessible and available for copying and shall store them in a location suitable to preserve their physical integrity.

(d) On written request of the regulatory agency, a licensee shall furnish the department a copy of any requested record pertaining to the application of pesticides. The department may require all persons
who apply a regulated herbicide to submit periodically to the department a copy of the records required by this section.

Sec. 76.116 | Suspension, Modification, or Revocation of License.

(a) The head of a regulatory agency that licensed or certified an applicator may suspend, modify, or revoke a license or certificate, assess an administrative penalty, place on probation a person whose license or certificate has been suspended, reprimand a licensee or certificate holder, or take a combination of those actions if the head of the agency finds that the licensee or certificate holder has:

1. made a pesticide recommendation or application inconsistent with the pesticide’s labeling or with the restrictions on the use of the pesticide imposed by the state or the Environmental Protection Agency;
2. operated in a faulty, careless, or negligent manner;
3. refused, or after notice, failed to comply with an applicable provision of this chapter, a rule adopted under this chapter, or a lawful order of the head of a regulatory agency by which the licensee is licensed;
4. refused or neglected to keep and maintain the records required by this chapter or to make reports when and as required by this chapter;
5. failed to maintain financial responsibility as required by this chapter;
6. made false or fraudulent records, invoices, or reports;
7. used fraud or misrepresentation in making an application for a license or renewal of a license; or
8. aided or abetted a certified, licensed, or an unlicensed person to evade the provisions of this chapter, conspired with a certified, licensed, or an unlicensed person to evade the provisions of this chapter, or allowed the licensee’s license or the certificate holder’s certificate to be used by another person.

SUBCHAPTER H. ENFORCEMENT

Sec. 76.151 | Entry Power.

(a) The department, at any time and without notice during regular business hours, may:

1. enter and inspect a building or place owned, controlled, or operated by a person engaged in any activity regulated under this chapter or Chapter 1951, Occupations Code; and
2. inspect and review any record maintained by a person engaged in any activity regulated under this chapter or Chapter 1951, Occupations Code.
(a-1) The department may enter and inspect a building or place or inspect and review any record under Subsection (a) as necessary to:

(1) ensure compliance with this chapter or Chapter 1951, Occupations Code; or

(2) investigate a compliant made to the department.

(b) A regulatory agency is entitled to enter any public or private premises at reasonable times to:

(1) inspect any equipment authorized or required to be inspected under this chapter or to inspect the premises on which the equipment is kept or stored;

(2) inspect or sample land exposed or reported to be exposed to a pesticide;

(3) inspect an area where a pesticide is disposed of or stored; or

(4) observe the use and application of a restricted-use or state-limited-use pesticide or regulated herbicide.

(c) If a regulatory agency is denied access to any land to which access was sought at a reasonable time for any of the purposes listed in Subsection (b) of this section, the head of the regulatory agency may apply to a magistrate for a warrant authorizing access to the land for any of those purposes. On a showing of probable cause to believe that a violation of a rule relating to a purpose listed in Subsection (b) of this section has occurred, the magistrate shall issue the search warrant for the purposes requested.

Sec. 76.152 | Sampling.

The department is entitled to take a sample for official analysis from any package or lot of pesticides found within this state.

Sec. 76.1555 | Administrative Penalty.

(a) If a person violates a provision of this chapter or Chapter 1951, Occupations Code, or a rule or order adopted by the department under this chapter or Chapter 1951, Occupations Code, the department may assess an administrative penalty against the person as provided by Section 12.020, except that the penalty for each violation may not exceed $5,000. Each day a violation continues or occurs may be considered a separate violation for purposes of penalty assessment.

SUBCHAPTER I. REMEDIES

Sec. 76.184. Reports of Pesticide Adverse Effects.

(a) A person claiming adverse effects from an application of a pesticide may file with the appropriate regulatory agency a complaint report. The complaint report must contain the name of the person, if known, allegedly responsible for the application of the pesticide and the name of the owner or lessee of the land on which the pesticide was applied. The regulatory agency shall prepare a form
printed in English and Spanish to be furnished to persons for use in filing complaint reports. The form may contain other information that is within the person’s knowledge and requested by the head of the regulatory agency.

(b) As soon as practicable after receiving a complaint report, the regulatory agency shall notify the licensee, the owner or lessee of the land on which the alleged application occurred, and any other person who may be charged with responsibility for the adverse effects claimed. The regulatory agency shall furnish copies of the complaint to those people on request.

(c) To assess any adverse effects, the complaining party shall permit the regulatory agency and the licensee to observe, within reasonable hours, the land or nontarget organism alleged to have been adversely affected.

(d) Failure to file a complaint does not bar a civil or criminal action from being filed and maintained.

(e) The regulatory agency by rule may adopt procedures to be followed in the investigation of a report claiming adverse effects from an application of the pesticide.

**SUBCHAPTER J. PENALTIES**

**Sec. 76.201 Offenses.**

(a) A person commits an offense if the person distributes within this state or delivers for transportation or transports in intrastate commerce or between points within this state through a point outside this state, any of the following:

1. a pesticide that has not been registered as provided by this chapter, except for a pesticide that is not for use in this state and is only being manufactured, transported, or distributed for use outside of this state;

2. a pesticide that has a claim, a direction for its use, or labeling that differs from the representations made in connection with its registration;

3. a pesticide that is not in the registrant’s or manufacturer’s unbroken immediate container and that is not labeled with the information and in the manner required by Section 76.021 of this code;

4. a pesticide:
   
   (A) that is of strength or purity that falls below the professed standard or quality expressed on its labeling or under which it is sold;

   (B) for which a substance has been substituted wholly or in part;

   (C) of which a valuable constituent has been wholly or in part abstracted; or

   (D) in which a contaminant is present in an amount that is determined by the department to be a hazard;
A person commits an offense if the person:

1. detaches, alters, defaces, or destroys, wholly or in part, any label or labeling provided for by this chapter or a rule adopted under this chapter before the container has been emptied and rinsed properly;
2. adds any substance to or takes any substance from a pesticide in a manner that may defeat the purpose of this chapter or a rule adopted under this chapter;
3. uses or causes to be used a pesticide contrary to its labeling or to a rule of the department limiting the use of the pesticide;
4. handles, transports, stores, displays, or distributes a pesticide in a manner that violates a provision of this chapter or a rule adopted by the department under this chapter; or
5. disposes of, discards, or stores a pesticide or pesticide container in a manner that the person knows or should know is likely to cause injury to man, vegetation, crops, livestock, wildlife, or pollinating insects.

A person other than a person to whom the pesticide is registered commits an offense if the person uses for the person's advantage or reveals, other than to a properly designated state or federal official or employee, a physician, or in emergency to a pharmacist or other qualified person for the preparation of an antidote, any information relating to pesticide formulas, trade secrets, or commercial or financial information acquired under this chapter and marked as privileged or confidential by the registrant.

A person commits an offense if the person:

1. commits an act for which a certified applicator's license may be suspended, modified, revoked, or not renewed under Section 76.116 of this code; or
2. violates any provision of this chapter to which this section does not expressly apply.

A person commits an offense if the person:

1. knowingly or intentionally uses, causes to be used, handles, stores, or disposes of a pesticide in a manner that causes injury to man, vegetation, crops, livestock, wildlife, or pollinating insects;
2. violates Section 76.071(a);
3. has a permit to apply a powder or dry-type regulated herbicide and applies a herbicide that does not meet the requirements of Section 76.144(c);
4. violates a rule adopted under this chapter; or
5. fails to keep or submit records in violation of this chapter.
CHAPTER 7 TEXAS PESTICIDE REGULATIONS

SUBCHAPTER A. GENERAL

§7.1 Definitions.

In addition to the definitions set out in the Code, §76.001, the following words and terms, when used in this chapter, shall have the following meanings, unless the context clearly indicates otherwise.

1. Act—Texas Agriculture Code, Chapter 76, entitled Texas Pesticide and Herbicide Regulation.
2. Adjoining—Directly contiguous to a field on which pesticides may be applied or which is separated from a field only by a road, railway, or utility right-of-way, or by a government-owned land corridor or waterway having a width of not more than 100 feet.
3. Agricultural commodity—A plant or animal grown for sale, lease, barter, feed, or human consumption and animals raised for farm or ranch work.
4. Application—The placing of a pesticide on a plant, animal, building, or soil; or its release into the air or water to prevent or destroy pests.
6. Commissioner—The commissioner of agriculture of the State of Texas, or the commissioner’s designee.
7. CEU—Continuing Education Unit.
8. Dealer—Any person who distributes within or into this state any restricted-use or state-limited-use pesticides or regulated herbicides.
9. EPA—United States Environmental Protection Agency.
11. FAA—Federal Aviation Administration.
12. Farm labor camp—Housing used by one or more seasonal, temporary, permanent, or migrant workers and accompanying dependents which are owned, operated, or managed by the farm operator or licensed by the State of Texas.
13. Farm operator—The person responsible for the overall control and management of the crop.
14. Formulation—A mixture of active and inert ingredients prepared for use as a pesticide for practical use.
(15) Nurseryman--A person who possesses a current Class 1, 2, 3, or 4 nursery and floral certificate issued by the department.

(16) Person--Includes any individual, partnership, association, corporation, company, joint stock association, governmental subdivision, public or private organization of any character, body politic or any organized group of persons, whether incorporated or not; including any trustee, receiver, assignee, or similar representative thereof.

(17) Purchase--For purposes of this chapter, the term purchase does not prohibit a transaction in which the unlicensed person merely provides payment for the pesticide, but actual delivery or physical possession of the pesticide is made to and remains with a properly licensed person or a person under the direct supervision of a properly licensed person.

(18) Regulated herbicide--A herbicide product containing an active ingredient classified as a regulated herbicide by §7.30 of this title (relating to Classification of Pesticides).

(19) State-limited-use pesticide--Any pesticide product containing an active ingredient classified as a state-limited-use pesticide by §7.30 of this title (relating to Classification of Pesticides).

(20) Trained trainer--Anyone who has completed an EPA-approved WPS train-the-trainer program or a WPS-trained handler who may train workers only.

(21) Volatility--The tendency of a substance to change from a liquid or solid to a gaseous state. It is the movement of a pesticide in a gaseous state in the air from surface water, soil, or vegetation.

SUBCHAPTER B. REGISTRATION

§7.11 | Label Requirements.

Each pesticide distributed in this state shall bear a label containing the following information related to the pesticide:

(1) the label information required by FIFRA, if the pesticide is subject to registration under that law; or

(2) the following information, if the pesticide is not subject to registration under FIFRA:

(A) the accepted common name and/or chemical name of all active ingredients;

(B) the percentage by weight of each active ingredient and the percentage by weight of all inert ingredients;

(C) the name for each ingredient using the accepted common name, if there is one, followed by the chemical name; and

(D) a statement of percentages except that a sliding scale method of expressing percentages shall not be used (example: active ingredient name--6.0% to 8.0%);
the directions for use including, but not limited to the following:

(A) that it is a violation of federal and state law to use this product in a manner inconsistent with its labeling;

(B) to keep out of reach of children;

(C) application rates of product to be applied;

(D) proper mixing procedures;

(E) application methods;

(F) application limitations;

(G) restricted entry and preharvest intervals; and

(H) clean-up, storage, and disposal instructions;

SUBCHAPTER C. LICENSING

§7.20 | Application.

(a) An application for a commercial, or noncommercial or private applicator license will be deemed complete when the applicator has met the applicable licensing requirements.

(b) Application for pesticide dealer or applicator licenses shall be made on a form prescribed by the department.

(c) Except as provided by Chapter 2, Subchapter B of this title (relating to Consolidated Licenses), the license is valid for two years and shall expire on the last day of the month corresponding to the license anniversary date. Renewals made after the expiration date are subject to applicable late fees.

(d) Except as provided by Chapter 2, Subchapter B of this title, licensing and renewal fees are:

(1) Dealers: $250 for two years;

(2) Applicators:

   (A) Commercial: $200 for one year;

   (B) Noncommercial: $140 for one year;

   (C) Noncommercial applicators employed by a political subdivision of the State of Texas or of a federal agency operating in Texas who utilize the license solely in the course of their employment: $75 for one year;

   (D) Private: $100 for five years;

   (E) Certified Private: fee exempt. This certificate is no longer issued and was only available to
individuals certified prior to January 10, 1989. Existing certificates may be renewed and are fee exempt.

(e) A pesticide applicator or dealer’s license is not transferable. Change of ownership of an outlet or facility shall require a new application and applicable fees to be submitted.

(f) The licensee shall notify the department within 30 days of any change in the information provided as part of the application for a license. Failure to provide such information may be grounds for denial, suspension or revocation of the license.

(g) A commercial or noncommercial applicator in good standing may convert the license between these two categories by making application to the department and meeting the requirements for that license, including fees.

§7.21  |  Applicator Certification.

(a) Certification of Applicators. The department may certify pesticide applicator licensees and applicants for a license in the following license use categories and subcategories. An individual who is certified in a particular category is authorized to purchase, apply, or supervise the use of restricted use pesticides, state limited use pesticides or regulated herbicides described by that category subject to agency orders, Chapter 76 of the Texas Agriculture Code and federal law.

(1) Agricultural pest control: pesticide applications made to agricultural land as specified in the following subcategories:

(A) field crop: to control insects, diseases, weeds, or other pests of field crops, or the use of harvest aid pesticides in the production of field crops such as cotton, grains, oilseed crops, crops grown for seed, or crops harvested for animal feed (hay) or forage. This category does not include pesticide applications covered in category 1D (vertebrate control) or category 11 (soil fumigation);

(B) fruit, nut and vegetable: to control insects, diseases, weeds, or other pests, or the use of harvest aid pesticides, in the production of non-citrus fruit (category 1G Citrus Pest Control), nut and vegetable crops. This category does not include pesticide applications covered in category 1D (vertebrate control) or category 11 (soil fumigation);

(C) pasture and rangeland: to control insects, diseases, weeds, or other pests of field crops, agricultural pastures, rangeland, or adjacent riparian or natural areas, and may include applications to pasture or rangeland vegetation that is harvested for animal feed (hay). This category does not include pesticide applications covered in category 1D (vertebrate pest) or category 11 (soil fumigation);

(D) vertebrate pest: to control vertebrate pests affecting agricultural production of field, fruit, nut or vegetable crops, in turf, pastures, rangeland, riparian or natural areas, rights of ways, parks, or crops/vegetation to be harvested for animal feed. This category does not include the use of a sodium cyanide M-44 device (category 1I) or Compound 1080 Livestock Protection Collar (category 1H). Certification in this category requires prequalification as determined by the department;
(E) Farm commodity pest control: to apply pesticides (including commodity fumigants) to stored raw agricultural commodities on the farm, in a public or private confined storage facility or container, in an open storage platform or vehicle, or to agricultural equipment used to transport raw agricultural commodities, to control pests of a stored agricultural product or a pest subject to a state or federal quarantine requirement;

(F) Animal health: to control external parasites or pests of agricultural animals including applications of pesticides to, in, or on any area, facility, or vehicle used for the housing, maintenance, or transportation of an agricultural animal;

(G) Citrus: to control insects, diseases, weeds, or other pests in the production of citrus plants or citrus fruit. This category does not include the pesticide applications covered in category 1D (vertebrate control) or category 11 (soil fumigants);

(H) Livestock protection collar: for the use of a livestock protection collar containing sodium fluoroacetate (Compound 1080) for predator control in the protection of livestock. Specialized training provided by the department is a prerequisite for this category;

(I) M-44 device: for the use of a M-44 device for the control of wild or feral canids in the protection of livestock. Specialized training provided by the department is a prerequisite for this category;

(2) Forest pest control: to apply pesticides in forests, forest nurseries and forest seed production;

(3) Lawn and ornamental plant pest control; and

(A) Landscape maintenance: to control pests in the establishment or maintenance of lawns or ornamental plants grown for function or aesthetic purposes in landscapes, such as athletic fields, residential properties, industrial sites, golf courses, parks, and cemeteries. This category does not include the pesticide applications covered in category 1D (vertebrate control) or category 11 (soil fumigation); and

(B) Nursery plant production: to control pests in the production of ornamental plants or other nursery stock and commercial turf. This category includes plants in field production, greenhouses, shade houses, or similar structures. This category does not include pesticide applications covered in category 1D (vertebrate control) or category 11 (soil fumigants);

(4) Seed treatment: to control pests by treating seed prior to distribution or planting. This category is not required for planter box applications if the applicator is certified in the appropriate agricultural category or is a private applicator;

(5) Vegetation management: to control unwanted plant growth in rights-of-way, in the maintenance of roads, parking lots, utility lines, wind generator sites, pipelines, railways, airports, public surface drainways and ditches, industrial sites including oil field sites, adjacent riparian or natural areas and includes public sewer root control;

(6) Aquatic: to control aquatic weeds or other aquatic pests including aquatic animals, microbes or other pests and may include pesticide applications to adjacent riparian or natural areas when water is present. Does not include public health pest control (vector control) category 12;
(7) Demonstration and research: for demonstration or research purposes when using restricted use pesticides, numbered compounds, any pesticide not registered by U.S. Environmental Protection Agency (unless exempt from registration under FIFRA Section 25(b)), or any pesticide used in a manner inconsistent with the label directions. No additional categories required;

(8) Regulatory pest control: for applications of pesticides when implementing a regulatory program such as a plant pest quarantine, invasive weed control, or other regulated activity conducted by a state, federal or other political subdivision. This category does not include pest control category 12 (public health pest control (vector control));

(9) Aerial application: The use of a pesticide applied by aircraft to any crop or site. In addition to certification in this category, certification in one or more of the appropriate use categories is required;

(10) Category unassigned;

(11) Soil fumigation: to apply fumigant pesticides to soil environments. This category is available for all pesticide license types and meets the pesticide product label requirement for EPA approved soil fumigant training. Private applicators may apply soil fumigant pesticides without adding this category, however additional EPA approved training stipulated on the use directions of a soil fumigant pesticide label must be met;

(12) Public health pest control (vector control): for pesticide applications made for the purpose of treating, repelling, mitigating, or otherwise controlling any non-human organism that is, or may be, a vector of human disease by a pesticide applicator who is an employee of, or an independent contractor for, a federal, state, county, city, mosquito or vector control district or other political subdivision, or a person working under the direct supervision of a pesticide applicator who is an employee of, or an independent contractor for, a federal, state, county, city, mosquito or vector control district or other political subdivision.

§7.22 | Licensing of Applicators.

(a) All pesticide examinations administered by the department under the authority of the Act, Subchapter E, shall be designed to cover the information necessary for an applicant to demonstrate competency to use and supervise the use of restricted-use and state-limited-use pesticides or regulated herbicides in a safe and effective manner.

(b) The department may enter into a memorandum of agreement with another state or a federal agency for reciprocity in licensing pesticide applicators.

(c) Doctors of veterinary medicine are exempted from licensing when:

(1) applying restricted-use or state-limited-use pesticides or regulated herbicides as drugs or medication during the course of normal practice; or

(2) when applying any pesticides not classified as restricted-use by EPA to property owned, rented or under the veterinarian’s general control.

(d) Commercial and noncommercial applicators must meet the following requirements:
(1) Anyone who makes a passing score on the General Standards pesticide applicator examination, including laws and regulations, and on one or more category exams will be eligible to be certified in those categories or subcategories for which a passing score was received and shall be licensed as soon as all other licensing requirements are met.

(2) An exam administration fee of $64 shall be required for administering each pesticide certification exam including the General Standards exam and each license use category and subcategory, and must be paid at the time the exam or exams are given. Fees for retakes of the General Standards exam or any pesticide certification category examination or subcategory examination may be charged to recover costs of exam administration.

(3) Individual exam scores are valid for only 12 months.

(e) Employees of state universities or state agencies may convert to a commercial or noncommercial license upon termination of employment by paying the required fee provided that all licensing requirements have been satisfied. Employees of state universities or state agencies who obtained their license through specialized training, testing and a Memorandum of Agreement with the department shall be prohibited from converting a license.

(f) Private applicators must meet the following requirements:

(1) A private applicator certification or license may be revoked by the department if the applicator is not engaged in the production of an agricultural commodity.

(2) An employee who qualifies as a private applicator under the Act, §76.112(c), is not considered to be providing equipment or pesticide when the employer is identified on the private applicator’s certification license application or amendment thereof, and either:

(A) the pesticide or equipment is purchased by the private applicator using a check, cash, or account of the employer; or

(B) the private applicator is reimbursed by the employer for the equipment or pesticide.

(3) Upon completion of the private applicator training, the trainee has one year to pass the private applicator examination without having to retrain. Retraining and retesting shall be required of anyone who does not complete requirements for licensing within five years of passing the private applicator exam.

(4) Military service members and military veterans, as defined in Texas Occupations Code, Chapter 55, will be credited with experience equivalent to the training required by §7.21(b)(4)(A) - (F) of this title (relating to Applicator Certification).

§7.24 | Applicator Recertification.

(a) All applicators must meet recertification requirements through completion of approved continuing education activities.

(b) Approved activities may include lectures, panel discussions, organized video or film with live instruction, field demonstrations, or other activities approved by the department.

(c) Each activity must be approved by the department. No activity may claim to be approved or accepted
by the department or use any other such term that would lead an applicator to believe that it has been approved by the department for recertification unless it is so approved.

(d) The department shall assign one continuing education unit (CEU) for each 50 minutes of net actual instruction time presented at an approved activity. Accreditation will consist of no less than one CEU for any given course or session. Accreditation in 1/2 CEUs may be allowed as determined by the department.

(e) To be eligible for approval, the department will require:

1. that the activity have significant educational or practical content to maintain appropriate levels of competency;
2. that the activity be conducted by a university, a governmental agency, an association, or a private independent nonapplicator business;
3. that each activity has a recordkeeping procedure for verifying applicator attendance using department forms or approved formats;
4. that activities cover one or more of the following topics pertaining to pesticides:
   A. label and labeling comprehension;
   B. safety factors;
   C. environmental consequences;
   D. pest features;
   E. integrated pest management strategies/pest management practices;
   F. pesticide factors;
   G. equipment characteristics;
   H. application techniques/drift minimization;
   I. laws and regulations;
   J. biotechnology/transgenic crops; or
   K. business ethics; and
5. the activity is able to comply with all applicable federal and state laws, including the Americans With Disabilities Act (ADA) requirements for access to activities.

(f) The department may consider for approval "correspondence activities" such as videos, interactive internet and/or other activities approved by the department. To be eligible for approval the department will require:

1. that the course sponsor complies with the specifications and requirements listed under subsections (a) - (e) of this section; and
2. that the activity include an open book measure of competency approved by the department.
(g) For commercial and noncommercial applicators only, the department may consider for approval, an intensive specialized training, equivalent to a maximum of a three-year recertification credit. Correspondence activities will not be allowed for this method of acquiring CEUs.

(h) Prior approval shall not be required for applicator recertification courses of up to three CEUs conducted by Extension faculty or department personnel for any pesticide applicator, provided that all other requirements for course content and records are met. The department may enter into a memorandum of agreement with Extension regarding the specific requirements for applicator recertification. Correspondence activities are excluded from this provision.

(i) Department personnel may monitor all approved activities, and all fees charged by the sponsor shall be waived for department personnel who monitor the recertification activity.

(j) The department may deny, revoke, or refuse to renew approval for any or all courses of a sponsor if the sponsor fails to file a timely activity report, fails to provide the quality of activity approved by the department, or fails to comply with any other requirements that are a basis for approval or that are a part of these rules.

(k) The department may enter into a memorandum of agreement with another state or non-profit professional society or association to recognize the state's pesticide applicator recertification or the society's professional recertification for satisfaction of the requirements of this section for commercial, noncommercial and private applicator recertification only if:

1. the standards for recertification meet or exceed the standards for the one-year or five-year recertification periods as set out in this section; and

2. the agreement reduces duplication of effort and does not increase the recordkeeping burden of the department.

(l) Each continuing education activity shall be approved for one calendar year only.

(m) In order for a recertification activity to be approved by the department, the sponsor must:

1. submit a completed department-prepared application form;

2. provide any additional material relevant to the activity which is requested by the department; and

3. submit the application and information required by the department at least 30 days in advance of the first date of the activity. The department may waive the 30-day provision providing all other requirements are met. The department will respond to the sponsor within ten days of receipt of the application and approve, reject, or request additional information.

(n) Sponsors who wish to continue approval must file for renewal annually on a form prepared by the department.

(o) Sponsors of approved activities shall:

1. prepare a roster of applicators who complete the activity which contains, at a minimum, the date, course number, number and type of accredited CEU(s), the pesticide applicator's name and current license or certificate number, the name and contact information of the course provider, and the location of the training;
(2) distribute a completion certificate at the time of the activity to applicators who successfully complete an activity, which shall indicate the name of the sponsor, the date, county and name of the activity, the amount and type of credit earned, and the assigned course number;

(3) provide the activity rosters to the department within 14 days after the end of an activity. The rosters must be on department forms or department approved format;

(4) ensure that CEUs awarded correspond proportionately to the net instruction time; and

(5) maintain activity rosters for a period of 2 years from the date of activity. Rosters are to be made available to the department upon request.

(p) Sponsors of approved correspondence activities shall:

(1) prepare a roster of applicators who complete the activity which contains, at a minimum, the date, course number, number and type of accredited CEU(s), the pesticide applicator's name and current license or certificate number, the name and contact information of the course provider, and the location of the training;

(2) distribute a completion certificate in a timely manner to applicators who successfully complete an activity, which shall indicate the name of the sponsor, the date, county and name of the activity, the amount and type of credit earned, and the assigned course number;

(3) provide the activity rosters to the department within 14 days after the end of an activity. The rosters must be on department forms or in a department approved format;

(4) ensure that CEUs awarded correspond proportionately to the net instruction time;

(5) ensure the establishment of procedures to prohibit an individual from repeating the sponsor's course in two consecutive recertification periods; and

(6) maintain activity rosters for a period of 2 years from the date of activity. Rosters are to be made available to the department upon request.

(q) Governmental agencies may enter into an agreement with the department for annual submission of recertification records of agency employees attending a recertification program approved for the agency by the department.

(r) No credit will be given for time used to promote the sponsor or other activities of the sponsor or for time used for organizational, political, procedural, or other nonrelevant activities.

(s) Applicators will recertify through a self-certification program. Each applicator will be required to maintain proof of the number of CEUs necessary to renew a license or certificate. Certificates of completion verifying attendance at approved activities during the previous licensing period must be maintained by the applicator for a period of 12 months after the most recent renewal of their license or certificate. The department may audit the CEUs an applicator has obtained during an onsite inspection or by letter requesting that copies of certificates of completion be mailed to the department. Certificates of completion will be compared with course attendance rosters on file with the department. Credits obtained at a single course cannot be split or divided between licensing periods.
Except as provided in paragraph (1) of this subsection, each commercial or noncommercial applicator must obtain at least five CEUs prior to the expiration of the license. A minimum of one hour each must be obtained from two of the following categories: integrated pest management, laws and regulations or drift minimization.

(1) For commercial or noncommercial applicators certified in the aerial application category, three of the required five CEUs must be associated with aerial application operations to include one CEU each in:

(A) laws and regulations;

(B) drift minimization; and

(C) pesticide safety activities addressing human factors. "Human factors" in aerial application is the portion of the aerial application mission which is guided or influenced by human characteristics. This includes pre-flight, post-flight, and cockpit decision-making that affects the safe operation of the aircraft, the pilot, farm workers, bystanders, or those that may be affected by the aircraft during its pesticide application mission.

(2) A commercial or noncommercial applicator may not recertify their license using department-approved correspondence activities for two consecutive years.

(u) An applicator who becomes unlicensed in any licensing year may not be relicensed for 12 months unless all CEUs required for the last year of licensing are completed. Until the 12-month period has elapsed, applicators are prohibited from retesting under §7.22 of the title (relating to Licensing of Applicators).

(v) Private applicators must recertify as follows:

(1) Each licensed private applicator must obtain 15 CEUs within a five-year period including at least two CEUs in laws and regulations and two CEUs in integrated pest management.

(2) Each licensed private applicator must obtain 15 CEUs prior to their license expiration date.

(3) Private applicators issued a certificate prior to January 10, 1989, may fulfill their recertification requirement on a one-time only basis by completing the Extension private applicator training program, attaining a passing score on the private applicator test, and obtaining a private applicator license. Certified private applicators who choose not to license but wish to maintain certification under a certificate issued prior to January 10, 1989, will be required to recertify as specified for licensed private applicators in this subsection.

(4) Private applicators have the option of forgoing continuing education requirements for a recertification period by following these procedures:

(A) Take and pass a comprehensive examination administered by the department which will contain questions relevant to those topics which would be covered at various continuing education activities. A certificate of completion worth 15 CEUs will be issued by the department upon a passing score being attained by the applicator.
(B) If the applicator fails the examination, subsequent attempts will be allowed until a passing score is attained. If a passing score is not attained, the applicator may obtain the required CEUs pursuant to this subsection.

(C) Pay a required fee of $64 for the administration of each recertification examination.

(5) A private applicator may not obtain more than 10 CEUs through correspondence activities in any five-year recertification cycle.

(w) Failure to comply with the continuing education requirements for commercial, noncommercial and private applicators will:

(1) result in nonrenewal of an applicator’s license or certification until the necessary credits for continuing education are attained;

(2) prohibit applicators from retesting for a new license in lieu of meeting recertification requirements until one year after the expiration of their license;

(3) require the applicator to take and pass comprehensive department examinations for general knowledge and for each category in which the applicator seeks to be licensed if the applicator does not recertify and renew in one year following the expiration of the license;

(4) require retraining of commercial, noncommercial and private applicators for categories or subcategories requiring special training if the applicator does not recertify and renew in one year following the expiration of the license; and (5) subject a noncompliant applicator to administrative, civil or criminal penalties and/or license or certificate revocation, suspension, modification or probation for failure to comply with continuing education requirements if the applicator operates under a license that has not been renewed.

(x) An applicator may seek credit for a continuing education activity that has not been submitted by the sponsor to the department, and the department will evaluate the supporting documentation of the course and assign the appropriate number of credits for the activity. To be eligible for accreditation, the following conditions must be met:

(1) the activity must contain course content of the highest standards;

(2) the activity must be sponsored by an in-state or out-of-state institution of higher education, or an out-of-state regional or national association, or the state or federal government;

(3) the activity must be in an area directly related to the activities of a commercial, noncommercial or private applicator;

(4) the applicator shall provide the department with sufficient information describing activity content including the time allotted to each aspect of the activity, identification of sponsor, instructor’s name and address, proof of attendance, date, time, and place of the activity; and

(5) the information for the desired credit must be submitted within 60 days after completion of the activity.

(y) An applicator may file a written request for an extension of time for compliance with any deadline in these rules. Such request for extension may be granted by the department if the applicator files...
appropriate documentation to show good cause for failure to comply timely with the requirements of this subsection. Good cause means illness, extended medical disability, military deployment, or other extraordinary hardship which is beyond the control of the person seeking the extension.

(z) Applicators licensed as both private and commercial or noncommercial may satisfy requirements for private applicator recertification by meeting the recertification requirements for commercial and noncommercial applicators.

§7.25 | Expiration and Renewal of Licenses.

(a) A licensee who fails to file a complete application for renewal on or before the license expiration date must pay a late fee as prescribed by the Code, Chapter 12.

(b) The license of a person who fails to timely file a complete application for renewal is invalid until a completed application and any required late fee has been received by the department. A person who applies a restricted-use or state-limited-use pesticide or regulated herbicide during a period when the person’s license is invalid may be assessed administrative penalties in addition to any required late fee.

(c) If a complete application for renewal of a commercial, noncommercial or private applicator’s license is not submitted within one year after the expiration of the license, the license will be deemed to be terminated voluntarily and a renewal application will not be accepted. Before being licensed again, the applicator must meet the requirements for a new license.

(d) Pursuant to the Act, §76.113, the head of the licensing agency in determining whether additional training shall be required of current licensees before renewal of their applicator license may consider changes in technology, pesticide related problems, or the performance of individual applicators. If general retraining and/or retesting is required for all applicators in a category or subcategory, the licensing agency will publish notice at least six months in advance of the license renewal date. If individual retraining and/or retesting is required as a result of the applicator’s performance, the agency may give notification and set a time and place of retraining that would be in the best interest of public health and environmental protection.

(e) Military service members or military veterans as defined in Texas Occupations Code, Chapter 55, will be credited with experience when equivalent to the pre-license requirements of §7.21(b)(4)(A) - (F) of this title (relating to Applicator Certification).

(f) License applications of military spouses, as defined in Texas Occupations Code, Chapter 55, shall be processed on an expedited basis.

(g) If a qualified military spouse applicant holds a current license issued by another jurisdiction and licensing requirements of that jurisdiction are substantially equivalent to the licensing requirements of the department, the department shall issue the applicant a license. For purposes of this subsection, substantially equivalent means:

(1) the requirements of the other jurisdiction require written, proctored examinations for initial certification for the same type of pesticide applicator license being requested;
(2) the other jurisdiction has a state pesticide plan approved by the U.S. Environmental Protection Agency; and

(3) the department has a current reciprocal agreement with the issuing jurisdiction for pesticide licensing.

**SUBCHAPTER D. USE AND APPLICATION**

§7.31 | Supervision.

a) If there is a discrepancy between supervision requirements contained in federal laws or regulations, state laws or regulations, or the pesticide label, the supervision requirement that requires the greatest degree of direct supervision by the licensed applicator shall apply. Licensed applicators may only supervise application of pesticides for categories or subcategories in which they are certified.

(b) A person may not supervise the use of a restricted-use or state-limited-use pesticide or regulated herbicide unless the person is licensed as a commercial, non-commercial or private applicator with the department. A certified private applicator may not supervise the use of restricted-use or state-limited-use pesticides or regulated herbicides. A licensed applicator may not supervise an applicator whose license or certificate is under revocation or suspension.

(c) A business that applies a restricted-use or state-limited-use pesticide or regulated herbicide to the land of another for hire must be operated by or employ a licensed commercial applicator. An application of a restricted-use or state-limited-use pesticide or regulated herbicide can only be made by the licensed applicator or by persons under the licensee's direct supervision.

(d) A licensed applicator is not required to be physically present at the time and place of the application of a restricted-use or state-limited-use pesticide or regulated herbicide to exercise direct supervision unless the label of the applied pesticide states that the presence of the licensed applicator is required. The licensed applicator must always be available when and if needed and is responsible for any actions of a person working under the licensee’s direct supervision.

(e) Except as provided in subsection (f) of this section, each licensed applicator is responsible for assuring that any person working under the licensee’s direct supervision is knowledgeable of the label requirements and rules and regulations governing the use of the particular pesticide being used by the individual. Working includes transporting a restricted-use or state-limited-use pesticide or regulated herbicide in any type of distributing or transporting equipment ready for application; mixing, storing and handling in packages or containers that have been opened; and applying and disposing of restricted-use or state-limited-use pesticides or regulated herbicides and cleaning equipment used to apply the pesticide. At a minimum, instructions shall include a review of appropriate sections of the Texas pesticide law and the Texas pesticide regulations, and reading of complete labeling information for the particular use of the pesticide product being applied. To ensure that appropriate instructions have been given to a nonlicensed person, the licensed applicator must verify or provide handler training to the nonlicensed applicator in accordance with the requirements of WPS. Licensed applicators supervising individuals applying products not under the scope of WPS must review
the label with the individual and have the individual sign and date the label or complete a form prescribed by the department.

(f) Licensed applicators employed by political subdivisions or cemeteries who supervise nonlicensed employees that make any pesticide application are responsible for assuring that the following requirements are met:

1. On an annual basis and prior to the nonlicensed employee making their first application, the nonlicensed employee must be trained in the specific use of the pesticide applied. The training requirement may be satisfied by either:
   A. the nonlicensed employee obtaining five CEUs in accordance with the continuing education required for licensed commercial and noncommercial applicators pursuant to §7.24 of this title (relating to Applicator Recertification); or
   B. the nonlicensed employee is trained on the appropriate laws and regulations pertaining to pesticide use, the label information for the use of all pesticides that are applied and pesticide safety training.

2. A record of training received or CEUs obtained by the nonlicensed employee must be maintained for a period of two years and shall be made available to the department for inspection upon request. The record may be either a certificate of completion of training or CEUs obtained or on a form prescribed by the department.

(g) Both the supervising licensed commercial or noncommercial applicator and the person under the direct supervision of the licensed commercial or noncommercial applicator must perform applications from the same local office, unless the supervising licensed commercial or noncommercial applicator is physically present during the application.

(h) A licensed private applicator may supervise the use of a restricted-use or state-limited-use pesticide or a regulated herbicide by a nonlicensed person on the property owned or controlled by the nonlicensed person, in accordance with the provisions of the Code, §76.112(a)(2) and subsection (e) of this section, and provided the licensed private applicator maintains a record of the application and also provides a record of the application to the nonlicensed person.

(i) A veterinarian licensed by the State Board of Veterinary Medical Examiners may supervise a nonlicensed person's use of a restricted-use or state-limited-use pesticide or regulated herbicide in the course of the veterinarian's normal practice, provided the veterinarian affords the nonlicensed person training in accordance with subsection (e) of this section.

§7.32 Records of Distribution.

(a) A person required to be licensed as a pesticide dealer by the Act, §76.071 shall maintain for a period of two years a record of each distribution of a restricted-use pesticide, state-limited-use pesticide, or regulated herbicide.

(b) The record of each distribution required to be kept by this section shall be kept separate from the person's other business records and shall contain:
(1) the name, address, applicator license or certificate number, dealer license number, or veterinary license number of the person to whom the pesticide is distributed;

(2) the date of the distribution;

(3) the brand name and the EPA registration number of the pesticide distributed;

(4) the quantity of the pesticide distributed;

(5) the name and address of any person who took delivery of the pesticide on behalf of, and acting under the authorization of the responsible licensed or certified applicator, including distributions to any entity on behalf of a Texas licensed pesticide dealer.

(6) if a pesticide that has been classified as a state-limited-use pesticide or a regulated herbicide, and is not a restricted-use pesticide under FIFRA, is made available to a nonlicensed person that resides out-of-state, and the person does not intend to use the pesticide in this state, the name and out-of-state address of the person. If the person holds a valid applicator license issued by another state or federal agency, the dealer must record that license number and the state or federal agency that issued the license.

(c) Records of distribution shall be kept current and maintained at the place of business where distribution occurs as designated on the pesticide dealer’s license.

(d) Records of distribution shall be made available for inspection by the department immediately upon request at any time during normal business hours.

(e) Copies of records of distribution must be submitted to the department within the time period specified in a written request by the department.

(f) Out-of-state licensed dealers who do not operate a physical distribution location in the state will be required to submit to the department on a quarterly reporting period (January-March, April-June, July-September, October-December), a complete record of all restricted-use or state-limited-use pesticides or regulated herbicides distributed into the state during the prior quarterly reporting period. Reports must be submitted to the department no later than 15 days after each reporting period. If no such distributions were made in a quarterly reporting period, the dealer shall submit a letter to the department no later than 15 days after the ending day of that reporting period stating that no such distributions were made. Forms for submitting distribution records under this subsection may be obtained from the department. If the department form is not used, the form submitted must contain all the information required by this section.

(g) All licensed pesticide dealers shall maintain a list of poison control centers in the state or other sources of contact designed to provide medical assistance in emergencies involving pesticide poisoning.

§7.33 | Records of Application.

(a) The following records of pesticide use shall be maintained for a period of two years:

(1) A person required by the Act to be licensed as a commercial applicator or a noncommercial applicator shall maintain records of each pesticide application regardless of the use classification of the pesticide applied.
(2) A person licensed or certified as a private applicator or licensed as a veterinarian shall maintain records of each application of a restricted-use pesticide, state-limited-use pesticide, or regulated herbicide.

(b) The record of each pesticide use required by this section shall contain:

(1) the date of the application;
(2) the beginning time for the application;
(3) the name of the person for whom the application was made;
(4) the location of the land where the application was made stated in a manner that would permit inspection by an authorized party;
(5) for each pesticide applied:
   (A) the product name;
   (B) the product EPA registration number;
   (C) the rate of product per unit;
   (D) the total volume of spray mix, dust, granules, or other materials applied per unit;
   (E) the name of the pest for which the product was used;
(6) the site treated (e.g., name of crop, kind of animal, etc.);
(7) total acres or volume of area treated (e.g., acre, square feet, number of head, etc.);
(8) wind direction and velocity except for those applications made indoors or otherwise within a structure;
(9) air temperature;
(10) application method or type of equipment used to make the application;
(11) the FAA "N" number for aerial application equipment;
(12) the name and department pesticide license number of the applicator responsible for the application and, if different, the name of the person actually making the application;
(13) the spray permit number for regulated herbicides applied in a regulated county; and
(14) Documentation to verify training of persons working under the supervision of a licensed pesticide applicator as required by §7.31 of this title.

(c) If several applications are made from a single load of pesticide to sites in close proximity, a single beginning time may be given for all the applications, but the sequence of applications must be specified by appropriately ordering the applications by person for whom the application was made and by the location of the land where the application was made.

(d) The record of each pesticide application shall be kept current and maintained at the applicator's
principal place of business as designated on the applicator’s application/renewal for a pesticide applicator’s license.

(e) The record of each pesticide application shall be legible and in a format that clearly identifies and sets forth each specific item of information required by this section.

(f) The department may exempt specific record items, which may not be applicable to a type of application upon written request and written approval. The person responsible for keeping records under this section shall maintain a copy of the department’s written approval for a record exemption as part of the application recordkeeping requirements of this section.

(g) Records of application shall be made available for inspection to the department immediately upon request at any time during normal business hours and shall contain all the information required by this section except as exempted in writing under subsection (f) of this section. The department’s written approval for any record exemption shall be made available to the department representative conducting the records inspection at the time of the inspection.

(h) Copies of records of application must be submitted to the department within the time period specified in a written request by the department and must contain all of the information required by this section except as exempted in writing under subsection (f) of this section. A copy of the department’s written approval for any record exemption shall accompany the copies of records submitted under this subsection.

§7.34 | Storage and Disposal of Pesticides.

(a) No person may dispose of, discard, or store any pesticide or pesticide container in a manner that may cause or result in injury to humans, vegetation, crops, livestock, wildlife, pollinating insects, or pollution of any water supply or waterway.

(b) Pesticides intended for distribution or sale must be displayed or stored within an enclosed building or fenced area, and may not be displayed on sidewalks, parking lots, or similar open areas without surveillance.

(c) Bulk storage tanks, when not enclosed in a secured fenced area or a building, must have a lock on the dispensing device.

(d) Pesticides in leaking, broken, corroded, or otherwise unsafe containers, or with illegible labels shall not be displayed or offered for sale. Such containers shall be removed from display areas and segregated from other pesticides for distribution to prevent environmental contamination or health and safety hazards prior to proper disposal or return to manufacturer.

(e) Pesticide containers, concentrates, spray mixes, container rinsates, and/or spray system rinsates that are to be discarded shall be disposed of in accordance with pesticide label directions and in accordance with the provisions of the Texas Solid Waste Disposal Act, Texas Health and Safety Code, Chapter 361.

(f) The applicator, the owner of the pesticide, and/or the person in control of the mixing site shall be jointly and severally liable for proper storage and disposal of pesticide containers and contents.
§7.35 | Registration and Inspection of Equipment.

All application equipment used for pesticide applications is subject to inspection by the department at any reasonable time. Such equipment must be maintained in a condition that will provide safe and proper application of the pesticide. If the inspector finds that it is not, the department shall require the needed repairs or adjustments before allowing the use of such equipment.

§7.37 | Prior Notification Requirements.

(a) Except as provided in subsection (n) of this section, the farm operator shall be responsible for meeting prior notification requirements. Responsibility may be transferred by contract to a second party. However, if the effective date of the transfer is unclear, both the farm operator and the second party may be held liable for any violation of these regulations.

(b) All applications of pesticides by ground application equipment, except airblast or mistblowing equipment, are exempted from this section.

§7.38 | Forbidden Pesticide Practices.

(a) The pesticide applicator shall be responsible for complying with the following standards:

(1) Pesticides may not be applied if persons not involved with the application of the pesticide are lawfully present in the area to be treated.

(2) The applicator shall stop the application of a pesticide if any person not wearing appropriate protective clothing lawfully enters the area to be treated.

(b) It is a violation of these regulations for any person employed by a farm operator to knowingly enter an area to which pesticides have been applied and the restricted-entry interval has not expired or to which pesticides are being applied, except as permitted by the label or federal WPS.

SUBCHAPTER E. REGULATED HERBICIDES

§7.50 | General Requirements for Regulated Herbicide Applicators.

(a) The following requirements are applicable to persons applying regulated herbicides in regulated counties. No person shall apply regulated herbicides as defined in §7.30 of this title (relating to Classification of Pesticides), without first obtaining a spray permit for such application. A blanket permit may be issued to a licensed or certified applicator. The department may require a licensed or certified applicator who has obtained a blanket permit to submit a supplemental report of any regulated herbicide applied under the terms of the permit.
(1) All permits expire when the acreage for which the permit was granted has been sprayed, or 180 days after issuance, whichever occurs first.

(2) Applications of regulated herbicides by brush, mop, wick, basal treatment, or injection method are hereby exempt from the requirements of obtaining a permit.

(3) Applications by an applicator licensed by the Texas Structural Pest Control Board in turf and weed control and a nurseryman licensed by the department in turf weed control for structural pest control applications are exempt from the permit requirements of this section.

(4) All persons applying regulated herbicides to lawns are exempt from the permit requirements of this section.

(b) All spraying of regulated herbicides must conform to these requirements in a regulated county regardless of whether or not a permit is required.

(1) Spraying high volatile herbicides is prohibited when there are susceptible crops within a four-mile radius from any point of the land to be sprayed. Highly volatile herbicides include methyl, ethyl, butyl, isopropyl, octylamyl, and pentyl esters containing various concentrations expressed in pounds of acid equivalent per gallon.

(2) No person shall spray regulated herbicides when the wind velocity exceeds 10 miles per hour or as specified on the product label, if the label is more restrictive.

(3) The use of any turbine or blower-type ground application equipment to apply regulated herbicides is prohibited.

**SUBCHAPTER F. ENFORCEMENT**

§7.60 | Enforcement

In addition to the enforcement powers of the commissioner found in the Act, Subchapter H, the department may enter the premises of a commercial, non-commercial, or private applicator, nursery, greenhouse, a registrant or dealer during normal business hours to:

(1) examine records;

(2) inspect any apparatus subject to the Act; or

(3) inspect pesticide packaging, labels and labeling information for compliance with the Act.

§7.62 | Complaint Investigation.

(a) Any person with cause to believe that any provision of the Act or this chapter has been violated may file a complaint with the department. The department will accept either written or oral notification, but may require that a complaint form be signed in order to conduct an investigation.
(b) Any person who has experienced or is alleging adverse effects from a pesticide application may file a complaint with the department. Such complaint shall be subscribed by the complaining party and set forth in detail the facts of the alleged violation.

(c) The department will investigate the complaint and make a full written report.

(d) This report will be made available to the parties concerned upon written request to the extent provided under the Texas Government Code, Chapter 552.

(e) The department shall, as soon as possible, notify the applicator(s) believed to be responsible for the complaint and the owner or lessee of the land where the application occurred.

(f) The department will not estimate monetary losses sustained.

(g) No finding of violation by the department will be premised solely on the uncorroborated statements of an anonymous or unidentified complainant, but all such complaints will be investigated routinely. For each such complaint, the department will determine the extent of investigation which is appropriate to address the complaint.

**SUBCHAPTER G. PENALTIES**

§7.71  |  Use Inconsistent with Label Directions.

It shall be a violation for any person to use or cause to be used a pesticide in a manner inconsistent with its label or labeling. Use inconsistent with the label includes, but is not limited to:

1. applications at sites, rates, concentrations, intervals, or under conditions not specified in the labeled directions, except:
   
   (A) applying a pesticide at any dosage, concentration, or frequency less than that specified on the labeling unless the labeling specifically prohibits deviation from the specified dosage, concentration, or frequency;
   
   (B) applying a pesticide against any target pest not specified on the label or labeling if the application is to the crop, animal, or site specified on the labeling, unless the department or EPA has required that the labeling specifically state that the pesticide may be used only for the pests specified on the labeling after the department or EPA has determined that the use of the pesticide against other pests would cause an unreasonable, adverse effect on the environment;
   
   (C) employing any method of application not prohibited by the labeling unless the labeling specifically states that the product may be applied only by the methods specified on the labeling or unless prohibited by law or regulation;
   
   (D) mixing a pesticide or pesticides with a fertilizer when such mixture is not prohibited by the labeling;
(E) when a pesticide is applied in conformance with an approved experimental use permit (EUP);

(F) when a pesticide is applied in conformance with an approved emergency exemption granted by EPA to a federal or state agency;

(G) when a pesticide is applied in conformance with an approved Special Local Need registration;

(H) when applied in any situation receiving prior written approval from EPA.

(2) tank mixing of pesticides, or using application techniques, or equipment prohibited by the label;

(3) failure to observe reentry intervals, preharvest intervals, grazing restrictions, or worker protection requirements:

(A) it is the responsibility of the person in control of the commodity or site treated to be knowledgeable of and comply with the requirements of this paragraph;

(B) if a commercial applicator furnishes the pesticide, it is the commercial applicator’s responsibility to notify the person in control of the commodity or site treated of the requirements of this section that pertain to restricted-entry intervals, preharvest intervals, grazing restrictions, or worker protection requirements, prior to, or at the time of treatment.

(4) improper storage or disposal of the pesticide or its container.

(5) it shall be a violation for any person to use or cause to be used a pesticide in a manner inconsistent with any permit, emergency exemption or special local needs registration issued by the department or EPA.