2007 Annual
Oklahoma Department of Transportation
Herbicide Program Report

Produced Under Project 2156 Section 7

A Joint project Between
the Oklahoma State University and the
Oklahoma Department of Transportation

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Issued in furtherance of Cooperative Extension work, acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture, Dr. Robert Whitson, Director of Oklahoma Cooperative Extension Service, Oklahoma State University, Stillwater, Oklahoma. This publication is printed and issued by Oklahoma State University as authorized by the Dean of the Division of Agricultural Sciences and Natural Resources. 12/2007.

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1.0 Introduction

The purpose of this annual report was to document the successes, failures and challenges of ODOT's chemical weed control program in 2007. In that each field division makes herbicide application decisions independent of other field divisions, we attempted to minimize comparisons among divisions in this report. However, it can be both interesting and useful to document trends in ODOT herbicide programs when similarities and differences in field division programs are surveyed. We attempted to document the progress of each field division on its own merit, considering the different attitudes and unique management goals within each field division. When appropriate, recommendations and comments were made to assist divisions in solving issues that became apparent after reviewing this year's herbicide surveys (Appendix A) and divisional meetings. It was our intent that the comments and criticisms included in this report would be of benefit to each field division's herbicide program. We are aware that each field division, in the development of its herbicide program, will have considerations unknown to Oklahoma State University Roadside Vegetation Management Program personnel. If there is disagreement by any division personnel to comments or recommendations, we ask that we have the opportunity to clarify recommendations.

While 2005/2006 proved to be a record drought for Oklahoma, 2006/2007 has provided record or near record rainfall for many areas in Oklahoma. Record levels of rainfall made the task of an “Elevated Level of Service” for the Oklahoma Centennial more difficult than under more normal conditions. Every field division experienced mowing and herbicide application scheduling difficulties because of the relentless rains that started in May and were nearly daily events through July. However, all field divisions were able to meet goals of significantly increasing the acreage treated with selective broadcast herbicide treatments during the 2007 season.

In the body of this report most references to herbicides will be made by using their common name instead of brand name. An example would be a reference to glyphosate instead of Roundup Pro Concentrate, Honcho Plus, or Mirage. This is an attempt to simplify the text of this report. When referenced common names are unfamiliar to the reader, you may refer to Table 11 for the corresponding brand name. Each Field Division’s Summary Table (Tables 1-8) will reference common name followed by specific brand names used by the division in parenthesis.

Finally, we would like to thank the divisions for their participation in this year's survey. Without the survey data and meetings held at each field division, this report will not reflect the entire ODOT herbicide program effort. We encourage each ODOT maintenance facility to fill out the annual herbicide program survey as accurately and completely as possible so this report can reflect as much of ODOT’s weed control effort as possible. We encourage suggestions as to how this report can be made more informative and useful and we always welcome input from all levels within ODOT.

2.0 Survey of the Division One Herbicide Program

2.1 Herbicide Program Survey Results

A total of 10 out of 10 maintenance facilities in Division One responded to the survey this year. In response to survey questions 2-11 no apparent concerns arose. A meeting was held at Division One headquarters on October 4, 2007 to solicit comments and opinions from division administrative personnel. The following observations and comments are made based on the surveys and meeting.

Division One herbicide usage is summarized in Table 1. The winter annual weed control program in Division One continued with glyphosate/2,4-D + AMS broadcast treatment. Winter annual weed control results were good from these treatments as both recommended application timings and rates were met. Acreages treated increased significantly from the previous year and it appears most Division One roadsides were treated with the glyphosate/2,4-D + AMS treatment. Division One was unable to incorporate aminopyralid to the glyphosate/2,4-D treatment as funds were not available in the Division One budget for additional herbicide costs. Division One's summer weed control program consisted mainly of treatments of glyphosate + sulfosulfuron at varying rates. Glyphosate rates varied significantly from 11-25 oz.prod./A combined with sulfosulfuron at 1-1.3 oz.prod./A. While results were overall good from these treatments we would like to encourage Division One county and interstate facilities to double check with their division headquarters personnel as to recommended rates they should be using. This will help maintain consistent results within your division and prevent over or under use of herbicides that have already been purchased for their individual areas. One additional facility used glyphosate + sulfometuron for a summer weed control program with good results. Adair County personnel are encouraged to call OSU personnel if unsure about herbicide tank mixes, surveys show this county was outside of recommendations. Acreages treated with both glyphosate-based summer weed control treatments were similar to the previous year with most division roadsides receiving treatment. Division One also used glyphosate (alone) to treat sign posts, guardrails, johnsongrass, and other total vegetation control areas with good results. Triclopyr ester was used as a cut-stump and foliar treatment to control brush with good success.

2.2 Comments and Recommendations from OSU Personnel

From both the survey and division comments, it appears Division One had a successful 2007 roadside weed control program. Comparing acreages treated from the past two years it looks like Division One crews treated nearly all roadsides with both a glyphosate/2,4-D + AMS winter annual weed control treatment and a glyphosate + sulfosulfuron summer weed control treatment. Division One met one of the major goals of the centennial year by significantly increasing the amount of roadside acreage treated with herbicides in 2007. Because of the 2006 drought problems and previous years budget issues this is the first year in several years that Division One has had both a successful winter annual weed control program followed by a summer weed control program. Division One administration has expressed interest in maintaining these levels of weed control programs but also states that in 2008 they may look at summer glyphosate + sulfometuron to lower treatment costs. OSU would like to remind Division One that if indeed they return to a summer glyphosate + sulfometuron treatment, instead of

continuing with this year's treatment, they should keep their herbicide rates more consistent as the glyphosate + sulfometuron treatment will produce more temporary bermudagrass injury. To minimize the bermudagrass injury while optimizing johnsongrass control we would recommend a rate of 0.5 lb. ai./A of glyphosate + 1.0 oz. prod./A of sulfometuron (follow treatment recommendations in new OSU publication E-958). Division One also states that it will be difficult to incorporate the use of aminopyralid into future herbicide programs mainly due to the significant increase in costs of this additional herbicide. While OSU understands the additional costs of a new herbicide like aminopyralid make it difficult to budget we ask that each field division keep in mind the unique benefits that are offered from this herbicide. Summer annual broadleaf weeds can become a major problem in roadside clear zones located adjacent to sensitive summer crops. If they cannot safely be controlled with summer postemergence treatments of dicamba then aminopyralid applied as a tank-mix partner with winter glyphosate/2,4-D + AMS treatments can provide good preemergence control of these same weeds. The only reason to look at aminopyralid is if summer annual weeds like marestail, ragweed, and sunflowers become an increasing problem. If treatment timings are met, a summer treatment of glyphosate + sulfometuron can control most of these weeds however; this treatment is often applied to late (June instead of May) and provides suppression instead of control.

A request has been made, on behalf of Division One, to have two gallons of aminopyralid donated to Division One by the manufacturer. The intention of this donated product is to give one Division One crew a chance to spray a large demonstration with this new herbicide so that Division One can monitor whether or not they would want to use aminopyralid in the future. The aminopyralid herbicide will be mixed with a tank load of glyphosate/2,4-D + AMS applied in a normal fashion, however, the aminopyralid herbicide should provide 4-5 months of preemergence summer broadleaf weed control.

Division One expressed interest in investing more of their future budgets in both sprayer equipment upgrades and maintenance. Investing a certain percentage of any annual budget for sprayer maintenance is a sound investment no matter how new or how old spray equipment is. Equipment upgrades tend to be more expensive but will also pay dividends in more accurate and efficient spray applications. OSU personnel are available to consult on both of these issues at the field division's discretion.

Table 1. Summary of Division One Herbicide Survey Results[1].

Herbicide Common Name (Trade Name)	Herbicide Rate/A[2]	Targeted Weed	Date Started	Date Ended	Acreages Treated		Overall Success (good, fair, poor)
					Average/Facility	Total Division	
glyphosate/2,4-D (Campaign) + AMS	0.5 pt + 4.5 lb (1) 2 pt + 4.3 lb (7) 2 pt + 5.3 lb (1)	broadleaf weeds winter annuals brome cheat hairy vetch	3-5-07	4-2-07	619	5,574	good (8) ??? (1)
glyphosate (Roundup Pro Concentrate) + sulfosulfuron (Outrider)	12 oz + 1 oz (1) 19 oz + 1.33 oz (3) 11 oz + 1 oz (1) 16 oz + 1 oz (1) 25 oz + 1.3 oz (2) 13 oz + 2.5 oz (1)	johnsongrass broadleaf weeds	5-23-07	7-26-07	616	5,547	good (9)
glyphosate (Honcho) + sulfometuron (Oust)	16 oz + 1 oz (1)	johnsongrass	6-13-07	6-20-07	540	540	good (1)
glyphosate (Roundup Pro Concentrate)	2.5 gal:300 gal water (1) 2 pt (1) ??? (1)	total vegetation control handgun brush johnsongrass	4-25-7	8-23-07	56	168+	good (3)
triclopyr ester (Garlon 4) + oil carrier	2 gal Garlon 4:3 gal oil (1) ??? (1)	brush basal bark treatment	5-23-07+	6-4-07+	-----	-----	good (2)

[1]Total number of responses to survey: 10 of 10.
[2]Numbers in parenthesis refer to the number of county/interstate facilities. A '???' indicates that information was not provided for the production of this report.

3.0 Survey of the Division Two Herbicide Program

3.1 Herbicide Program Survey Results

A total of 10 out of 10 maintenance facilities in Division Two responded to the survey this year. In response to survey questions 2-11 a couple of concerns became apparent. In response to survey question 4 which asked "How many personnel do you use on a spray truck when applications are being made", the response was 3 yards use only 1 personnel and an additional 3 use 1 or 2 personnel. Due to the safety aspects of a slow moving truck driving along roadside shoulders and the importance of making accurate herbicide applications it is critical to have two personnel on a spray truck. Each of the two personnel has multiple duties that are critical to the efficiency of the spray program and putting all of these duties on the shoulders of a single person puts that person in a very difficult position. OSU recommendations are to have two certified ODOT personnel on board of each spray truck during all applications whenever possible. Also, in response to survey question 5 which asked "How often is the herbicide spray truck calibrated", the response was that 1 out of 2 facilities only calibrated their spray rigs once per year. Minimum OSU recommendations are to calibrate all broadcast spray rigs once before each broadcast spray treatment. For most ODOT facilities that means a calibration procedure should be done before you spray for winter annual weeds (glyphosate/2,4-D + AMS) and summer weed control treatments (glyphosate or MSMA + sulfometuron or sulfosulfuron). The completed calibration forms would then become a part of the permanent record for the subsequent herbicide applications. A meeting was held at Division Two headquarters on September 5, 2007 to solicit comments and opinions from division administrative personnel. The following observations and comments are made based on the surveys and meeting.

Division Two herbicide usage is summarized in Table 2. Division Two applied glyphosate/2,4-D + AMS over most division roadsides to control winter annual weeds. Acreages treated this year for winter annual weed control was up significantly over the past several years. Glyphosate/2,4-D use rates were good but a few facilities may have used more AMS than was necessary. Glyphosate/2,4-D should be used at 2 pts. product per acre and AMS should be mixed at 17 lbs. of product per 100 gallons of water. As far as timing of applications, most facilities hit their timings perfectly, however, both Talihina and Pittsburg facilities were applying the glyphosate/2,4-D treatment 2-4 weeks later than is recommended. Treatments applied later than recommended may cause unacceptable injury to bermudagrass. Division Two used three different herbicide treatments to provide summer johnsongrass control. Treatments of glyphosate + sulfosulfuron accounted for 71% of the acreage. Glyphosate + sulfometuron and MSMA treatments were the additional treatments used this past year. Total acreage for these johnsongrass control treatments was up significantly over the recent past. Each of these treatments was used to successfully control johnsongrass and other summer weeds as most herbicide rates and timing of applications were met. Glyphosate + sulfometuron treatments were also used for total vegetation control for signs and guardrails with varying success. When using glyphosate + sulfometuron treatments for total vegetation control it is important to increase the rate of application over those normally used for johnsongrass control. Triclopyr ester treatments were applied with good success in controlling broadleaf weeds.

3.2 Comments and Recommendations from OSU Personnel

Division Two met one of the major goals of the centennial year by significantly increasing the amount of roadside acreage treated with herbicides in 2007. This was the first year that most Division Two facilities used the glyphosate/2,4-D + AMS to control winter annual weeds along their roadsides. While a couple of surveys said this treatment provided fair (2) to poor (1) weed control, most facilities achieved good results. We would like to encourage the Division to continue with this treatment in 2008. This is one of the most effective and cost efficient treatments that ODOT utilizes to reduce and delay mowing programs in the early spring. We encourage those facilities that did not achieve good weed control to call OSU prior to their applications in 2008 and check on the tank mixture calculations used for the glyphosate/2,4-D + AMS treatment. As per the request of Division Two personnel, the herbicide Diuron 80 WDG (same as the old Karmex), is being placed back on the ODOT Approved Herbicide and Adjuvant List and will be available to purchase and use on future ODOT herbicide contracts. The Diuron 80 WDG (Loveland Ind.) is the only formulation that has an existing label that allows legal roadside use at OSU recommended rates of application. This product will not be on contract until September of 2008, until then ODOT personnel interested in using this herbicide can purchase it from local distributors (see Section 10 for contact). The Diuron 80 WDG would be an alternative treatment for the glyphosate/2,4-D + AMS and also a good herbicide to apply with total vegetation control treatments to provide long term preemergence weed control. Recommendations for Diuron 80 WDG use can be found in the new "September 2007 E-958" publication on the Oklahoma State University home page.

We would like to encourage Division Two to continue their current summer weed control program efforts. Most summer applications this year included mixtures of glyphosate + sulfosulfuron which should have provided very good control of johnsongrass during a year when record amounts of rainfall produced tremendous amounts of weed growth. Many Division Two summer applications were made just prior to the heavy rains in late May and June. Controlling the johnsongrass prior to these rains should have made the roadside look good while adjacent non-treated areas were growing rapidly. If johnsongrass remains the main target, hopefully Division Two can continue with glyphosate + sulfosulfuron treatments. However, if summer broadleaf weeds increase in density or budgets become to tight there are less expensive treatments of glyphosate + sulfometuron that can be used.

A request has been made, on behalf of Division Two, to have two gallons of aminopyralid donated to Division Two by the manufacturer. The intention of this donated product is to give one Division Two crew a chance to spray a large demonstration area with this new herbicide so that Division Two can monitor whether or not they would want to use aminopyralid in the future. The aminopyralid herbicide will be mixed with a tank load of glyphosate/2,4-D + AMS and applied in a normal fashion, however, the aminopyralid herbicide should provide 4-5 months of preemergence summer broadleaf weed control. Also, in an extra attempt to get new Calc-An-Acre digital speedometers, with Astro II SPS sensors installed, on all Division Two spray trucks, a request has been made to ODOT personnel in Oklahoma City for a one-time purchase of these items using funds that were to be available for equipment upgrades for the Centennial Year "Elevated Level of Service" efforts. OSU personnel will notify Division Two personnel if this effort is successful.

Table 2. Summary of Division Two Herbicide Survey Results[1].

Herbicide Common Name (Trade Name)	Herbicide Rate/A[2]	Targeted Weed	Date Started	Date Ended	Acreages Treated		Overall Success (good, fair, poor)
					Average/Facility	Total Division	
glyphosate/2,4-D (Campaign) + AMS	2.5 pt + 7.65 lb (1) 2 pt + 6.8 lb (2) 2 pt + 3.4 lb (5)	winter annuals brome oats hairy vetch musk thistle	2-5-07	4-27-07	861	6,886	good (6) fair (2)
glyphosate/2,4-D (Campaign)	4 pt (1)	winter annuals	2-20-07	3-05-07	1,600	1,600	poor (1)
glyphosate (Roundup Pro Concentrate) + sulfosulfuron (Outrider)	32 oz + 1.33 oz (1) 19 oz + 1.33 oz (3) 16 oz + 1.2 oz (3) 17 oz + 0.67 oz (1)	johnsongrass perennials thistles dallisgrass broadleaf weeds	5-4-07	7-16-07	1,102	8,818	good (6) fair (2)
glyphosate (Roundup Pro Concentrate) + sulfometuron (Oust)	16 oz + 0.74 oz (1) 16 oz + 0.96 oz (1) 19 oz + 1.33 oz (1)	johnsongrass broadleaf weeds	9-19-06	7-30-07	633	1,899	good (3)
MSMA (MSMA)	2 qt (4) 1 qt (1)	johnsongrass thistles ragweed	4-16-07	8-16-07	337	1,687	good (5)
glyphosate (Roundup Pro Concentrate) + sulfometuron (Oust)	16 oz + 0.75 oz (2) ??? (1)	total vegetation control signs guardrails	4-9-07	7-20-07	25+	75+	good (2) poor (1)
triclopyr ester (Garlon 4)	0.5 gal (1)	broadleaf	7-26-07	8-1-07	50	50	good (1)

[1]Total number of responses to survey: 9 of 10.

[2]Numbers in parenthesis refer to the number of county/interstate facilities. A '???' indicates that information was not provided for the production of this report.

4.0 Survey of the Division Three Herbicide Program

4.1 Herbicide Program Survey Results

A total of 13 out of 13 maintenance facilities in Division Three responded to the survey this year. In response to survey questions 2-11 no apparent concerns arose. A meeting was held at Division Three headquarters on September 5, 2007 to solicit comments and opinions from division administrative personnel. The following observations and comments are made based on the surveys and meeting.

Division Three herbicide usage is summarized in Table 3. Division Three continued with its traditional glyphosate/2,4-D + AMS (March) with 3 counties incorporating aminopyralid into this treatment. Treated acres increased over previous years for these winter annual weed control treatments. Survey results show good weed control from most of these treatments as both application rates and treatment timings were met. There were however a few treatments being applied after the recommended shut-off date. If treatments of this nature are applied later than recommended they may cause unacceptable injury to bermudagrass if spring green-up is too far along. With respect to those glyphosate/2,4-D treatments that were tank-mixed with aminopyralid, the Division Three jury is still out as to how much benefit the new herbicide added to the overall weed control program. Plans are to continue with some aminopyralid use in 2008 but it will be monitored closely to make sure ODOT is getting satisfactory weed control to justify the additional treatment costs. Most Division Three roadsides received a summer glyphosate + sulfosulfuron treatment which produced good to fair results. In the opinion of Division Three personnel, results from this years treatments were overall not quite as good as previous years primarily due to the increased amount of rainfall and aggressive johnsongrass growth. This year Division Three continued with glyphosate + sulfosulfuron rates of application that had been used in previous years (1 pt. + 1 oz.) and elected not to incorporate the one-time, 2007, recommendations of increased summer glyphosate + sulfosulfuron rates. These one-time 2007 recommendations were based on goals set by ODOT Maintenance Engineers and Director of Operations for the state centennial year. Division Three also used treatments of glyphosate alone or mixed with sulfosulfuron and aminopyralid for total vegetation control treatments. Crews experienced varied results from these treatments as inconsistent rates were used.

4.2 Comments and Recommendations from OSU Personnel

Division Three continued this year with a very consistent herbicide program. We would like to encourage Division Three to continue with their current herbicide program efforts with one word of caution. Division Three has been in a very similar herbicide program for at least 5 consecutive years, while the weed control results remain good overall this type of consistent herbicide use will eventually begin to select for an increase in certain species of weeds. Some of these weeds will likely require a change in one or more herbicides before they will be controlled. Under the current program OSU would expect a slow release of both summer annual and perennial broadleaf weeds. If and when this were to occur, Division Three Supervisors should keep track of new weed problems and temporary adjustments could be made to existing herbicide treatments to control the new weeds. Good close-up digital pictures of weeds can easily be sent to OSU personnel for assistance in weed identification. We would like to

encourage Division Three to incorporate aminopyralid treatments into other counties next year that did not get a chance to see the benefits supplied from this new preemergence herbicide. Several ODOT Field Divisions experienced very good summer broadleaf weed control when compared to herbicide programs in the recent past.

In an extra attempt to get new Calc-An-Acre digital speedometers with Astro II GPS sensors installed on all Division Three spray trucks, a request has been made to ODOT personnel in Oklahoma City for a one-time purchase of these items using funds that were to be available for equipment upgrades for the Centennial Year "Elevated Level of Service" efforts. OSU personnel will notify Division Three personnel if this effort is successful.

Table 3. Summary of Division Three Herbicide Survey Results[1].

Herbicide Common Name (Trade Name)	Herbicide Rate/A[2]	Targeted Weed	Date Started	Date Ended	Acreages Treated		Overall Success (good, fair, poor)
					Average/Facility	Total Division	
glyphosate/2,4-D (Campaign) + AMS	2 pt + 3 lb (4) 2 pt + 3.4 lb (3) 2 pt + 2.5 lb (1) 2 pt + 5.1 lb (1)	winter annual weeds	3-7-07	4-19-07	656	5,901	good (8) fair (1)
glyphosate/2,4-D (Campaign) + aminopyralid (Milestone VM) + AMS	2 pt + 3.8 oz + 3 lb (1) 2 pt + 4 oz + 3.4 lb (1) 2 pt + 4 oz + 2.88 lb (1)	winter annuals	3-5-07	4-19-07	828	2,484	good (3)
glyphosate (Honcho, Honcho Plus) + sulfosulfuron (Outrider)	1 pt + 1 oz (9)	johnsongrass silver bluestem switchgrass broadleaf weeds	6-5-07	8-17-07+	677	6,090	good (7) fair (1) ??? (1)
glyphosate (Honcho)	0.75 pt (1)	johnsongrass	7-16-07	7-26-07	723	723	good (1)
glyphosate (Honcho, Honcho Plus)	2% solution (2)	total vegetation control posts guardrails handgun	3-22-07	8-17-07	32	63	good (1) ??? (1)
glyphosate (Mirage) + sulfosulfuron (Outrider) + aminopyralid (Milestone VM)	2 pt + 1 oz + 4 oz (1)	total vegetation control	4-18-07	4-25-07	71	71	fair (1)

[1]Total number of responses to survey: 11 of 12.

[2]Numbers in parenthesis refer to the number of county/interstate facilities. A '???' indicates that information was not provided for the production of this report.

5.0 Survey of the Division Four Herbicide Program

5.1 Herbicide Program Survey Results

A total of 9 out of 9 maintenance facilities in Division Four responded to the survey this year. In response to survey questions 2-11 only a single concern arose. In response to survey question 4 which asked "How many personnel do you use on a spray truck when applications are being made", the response was 3 yards use only 1 personnel and an additional 3 use 1 or 2 personnel. Due to the safety aspects of a slow moving truck driving along roadside shoulders and the importance of making accurate herbicide applications it is critical to have two personnel on a spray truck. Each of the two personnel has multiple duties that are critical to the efficiency of the spray program and putting all of these duties on the shoulders of a single person puts that person in a very difficult position. OSU recommendations are to have two certified ODOT personnel on board of each spray truck during all applications whenever possible. On September 13, 2007 a Division Four Herbicide Program meeting was held at the division headquarters. The comments and recommendations in this report are based on the surveys and meeting.

Division Four herbicide usage is summarized in Table 4. Division Four used two similar treatments this past year to control winter annual weeds. Both glyphosate/2,4-D + AMS and glyphosate + AMS treatments were used along with the addition of aminopyralid. Approximately 3/4ths of the division used the glyphosate + AMS alone treatments, at a rate of 1 qt. product per acre, to control annual ryegrass with the remainder of the yards using the traditional glyphosate/2,4-D + AMS. All treatment rates and timings were good, however, one facility was unnecessarily adding additional non-ionic surfactant to each load of glyphosate/2,4-D. All herbicides which come pre-packaged with a surfactant do not need additional surfactant. All herbicide labels will say whether or not the herbicide is packaged with a surfactant and/or the applicator can mix a small amount of the herbicide in a bottle of water and after shaking the bottle should see quite a bite of foam (surfactant) produced. Winter annual weed control treatment acreage was up compared to past years. The broadleaf weed control achieved from the addition of aminopyralid to the winter annual weed control treatments received positive comments from 6 of 9 facilities. In 2007 Division Four used the centennial year recommendations of glyphosate + sulfosulfuron for about 2/3rds of the division. The other 1/3 of the division used a treatment of glyphosate + sulfometuron to control johnsongrass and other summer weeds. Acreage treated with johnsongrass control treatments was up compared to past years. Overall johnsongrass control results were good as both treatment rates and timings were met. Division Four personnel used clopyralid to spot & broadcast treat musk thistle with success. A variety of treatments were used to provide total vegetation control around guardrails, signs, and road edges. Most treatments were comprised of mixtures of glyphosate, imazapyr, sulfometuron, aminopyralid, and/or imazapyr/diuron. Total vegetation control results were good for most of these treatments as rate and timings were met. Division Four, Terry Shrum/Noble County upgraded their traditional single boombuster nozzle roadside sprayer to a three boombuster nozzle sprayer mounted on a control arm and nozzles were moved to the front of the spray truck. Having 3 boombuster nozzles will allow 10, 20, and 28 foot swaths to be treated with the touch of a button. Having the electric control arm will allow the angle of the spray pattern to be changed to maintain the desired spray width no matter what angle of slope is encountered on the roadside. Moving the spray nozzles to the front of the truck will allow ODOT

personnel to more easily monitor the spray pattern during applications. This is the first spray truck to receive such an upgrade in Division Four and with the positive feedback there will likely be other Division Four spray rigs receiving similar upgrades in the future.

5.2 Comments and Recommendations from OSU Personnel

The level of weed control from Division Four winter annual and johnsongrass control treatments this year was probably the best it's ever been. There are several reasons why the results were above average this year, good growing conditions and prioritized herbicide treatments were likely responsible for much of the affects. In an unprecedented effort, at least to OSU personnel, when Division Four began the winter annual weed control and johnsongrass control treatments they were working as a single team that had the goal of treating an entire division, instead of individual teams treating their county. When a Division Four crew finished spraying their county they were to assist treating neighboring counties until the entire division was treated. This effort is documented in Table 4 as the starting and ending treatment dates for the winter annual and johnsongrass control treatments are very short compared to the past. There are a lot of advantages in prioritizing herbicide treatments when it comes time for them to be applied. The efforts of Division Four spray crews this year proved that weed control can be optimized with prioritized treatments and that there are no better spray crews in the state than ODOT spray crews that are motivated.

Treated acreages for both winter annual and summer johnsongrass control treatments were significantly increased this year in Division Four which should help ODOT meets the goals set for the centennial year. We would like to encourage Division Four in continuing the same weed control programs into the 2008 spray seasons. Division Four has stated they will likely continue with the aminopyralid tank-mix with their winter annual weed control treatment and will try and continue with a summer glyphosate + sulfosulfuron treatment. If budgets are available we would also encourage the divisions to continue with similar sprayer upgrades that were implemented on the Noble County spray truck this year.

It was observed this past year by OSU personnel that several Division Four crews utilized the Patchen roadside shoulder sprayer to apply total vegetation control treatments to many areas. Most of the treated areas looked good but it was apparent that some applications were being applied several feet (3-5) outside of what should have been the target area. Some of these treated areas may have been the result of drift and in those cases applications were being made during excessive winds. It would help a great deal if a solid (rubber type) skirt would be placed around the Patchen boom to prevent excessive drift as the treatment combinations and rates being applied can cause severe damage to adjacent grass even if they receive only a slight amount of drift. Also, hopefully division four personnel who used the Patchen sprayer for the first time found out that the outside two tips on the spray boom are angled severely to treat a wider pattern and if not careful these tips will spray roadside areas that should not be treated. The goal of the Patchen sprayer is to treat and control all vegetation that is growing in hard surface cracks and seams and maybe spray a one foot zone off of the pavement edge. Drift or spraying several feet off of the hard surface edge should be prevented as this may kill all or part of the bermudagrass with the barren area likely to reinfest with annual weeds or start edge erosion. The Patchen sprayer can also be used a night when wind speeds tend to be lower.

Table 4a. Summary of Division Four Herbicide Survey Results[1].

Herbicide Common Name (Trade Name)	Herbicide Rate/A[2]	Targeted Weed	Date Started	Date Ended	Acreages Treated		Overall Success (good, fair, poor)
					Average/Facility	Total Division	
glyphosate (Honcho Plus, Roundup Pro Concentrate) + aminopyralid (Milestone VM) + AMS	1 qt + 4 oz + 4 lb (5) 1 qt + 4 oz + 5 lb (1)	winter annuals broadleaf weeds summer preemergent	2-26-07	3-10-07	816	4,894	good (6)
glyphosate/2,4-D (Campaign) + aminopyralid (Milestone VM) + AMS	30 oz + 3.7 oz + 4.7 lb + surfactant (1) 32 oz + 4 oz + 4 lb (1) 32 oz + 4 oz + 4.7 lb (1)	winter annuals sweet clover summer broadleaf weeds	3-5-07	3-14-07	548	1,644	good (3)
glyphosate (Roundup Pro Concentrate) + sulfosulfuron (Outrider)	13 oz + 1.33 oz (1) 16 oz + 1 oz (2) 19 oz + 1.3 oz (2) 22.2 oz + 1.4 oz + surfactant (2)	johnsongrass broadleaf weeds silver bluestem summer annuals	5-31-07	6-12-07	662	4,634	good (6) fair (1)
glyphosate (Roundup Pro Concentrate, Honcho Plus) + sulfometuron (Oust)	19 oz + 1.3 oz (1) 16 oz + 1 oz (2)	johnsongrass	5-17-07	6-17-07	698	2,095	good (2) fair (1)
MSMA	??? (1)	???	6-12-07	6-12-07	43	43	fair (1)
clopyralid (Transline) + surfactant	12.5 oz + ??? (1) 12 oz (1) 4 oz + 12 oz (1)	musk thistle	3-16-07	6-4-07	4.7	14	good (3)
triclopyr ester (Garlon 4) + oil carrier	??? (1)	???	6-10-07	6-10-07	2	2	good (1)

[1]Total number of responses to survey: 9 of 10.

[2]Numbers in parenthesis refer to the number of county/interstate facilities. A '???' indicates that information was not provided for the production of this report.

Table 4b. Summary of Division Four Herbicide Survey Results[1].

Herbicide Common Name (Trade Name)	Herbicide Rate/A[2]	Targeted Weed	Date Started	Date Ended	Acreages Treated		Overall Success (good, fair, poor)
					Average/Facility	Total Division	
glyphosate (Roundup Pro Concentrate) + surfactant	??? (1)	total vegetation control johnsongrass silver bluestem	5-11-07	7-20-07	4.3	4.3	good (1)
imazapyr (Imazapyr 2 SL)	4 pt (1) 1 gal (1)	total vegetation control signs guardrails	4-19-07	7-17-07	77	154	good (2)
imazapyr (Arsenal) + aminopyralid (Milestone VM)	13 oz + 5 oz (1)	total vegetation control	5-14-07	5-14-07	2	2	good (1)
imazapyr (Arsenal) + glyphosate (Roundup Pro Concentrate)	2 qt + 1 gal (1) 2 qt + 1 gal + surfactant (1)	total vegetation control	3-27-07	8-16-07	22	44+	good (2)
imazapyr (Arsenal) + glyphosate (Roundup Pro Concentrate) + sulfometuron (Oust)	1 gal + 2 gal + 12 oz/ 100 gal tank (1) 1 gal + 2 gal + 4 oz/ 100gal tank (1)	total vegetation control Patchen Sprayer	5-31-07	6-22-07	19	37	good (2)
imazapyr/diuron (Sahara DG) + sulfometuron (Oust XP) + surfactant	10 lb + 2 oz + 7 oz (1)	total vegetation control pigweed kochia	5-10-07	6-19-07	23	23	good (1)

[1]Total number of responses to survey: 9 of 10.

[2]Numbers in parenthesis refer to the number of county/interstate facilities. A '???' indicates that information was not provided for the production of this report.

6.0 Survey of the Division Five Herbicide Program

6.1 Herbicide Program Survey Results

A total of 13 out of 13 maintenance facilities in Division Five responded to the survey this year. In response to survey questions 2-11 no apparent concerns arose. A meeting was held at Division Five headquarters on September 10, 2007 to solicit comments and opinions from division administrative personnel. Comments and recommendations in this report are based on the surveys and meeting.

Division Five herbicide usage is summarized in Table 5. For their 2007 winter annual weed control program, Division Five continued with the division-wide treatment of glyphosate/2,4-D + AMS with approximately ½ of the tankloads including aminopyralid. Having half of each maintenance area treated with and without aminopyralid gave personnel a good chance to evaluate the ability of the new preemergence herbicide to control summer broadleaf weeds. All thirteen maintenance facilities had positive comments about the weed control produced by aminopyralid. The aminopyralid herbicide was able to produce good broadleaf weed control even during a spring and early summer that had record levels of rainfall. Excessive rainfall can often cause preemergence or residual type herbicides, like aminopyralid, to loose weed control prematurely. Winter annual weed control treated acreage increased over past years and overall weed control results were good. Division Five crews used recommended rates of glyphosate/2,4-D + AMS, however about 20% of the treatment timings were later than recommended. Treatments applied later than recommended may cause unacceptable injury to bermudagrass and predispose bermudagrass to injury from summer johnsongrass control treatments that included glyphosate and/or sulfometuron. Division Five summer johnsongrass control programs consisted mainly of glyphosate + sulfometuron treatments with the remainder being treated with combinations of MSMA, diglycolamine salt of dicamba, and sulfometuron. Treatment acreages were up slightly over previous years. Treatment timings and most rates of application were good resulting in overall good weed control. A couple of facilities were using glyphosate rates outside of recommendations which likely caused significant injury to bermudagrass. Caution should be used, especially in western Oklahoma, when using higher herbicide rates of both glyphosate and sulfometuron as bermudagrass and many other beneficial grasses tend to be more sensitive to damage to these products. Division personnel did mention, at September meetings, a concern about whether glyphosate + sulfometuron treatments were causing bermudagrass thinning in areas that were already thin to start with. Glyphosate rates higher than 0.5 lb. ai./A should not be used on western Oklahoma roadsides for selective weed control during the growing season. If this were happening it would be important to switch from glyphosate + sulfometuron treatments to the safer glyphosate or MSMA + sulfosulfuron treatments. Treatment costs may be higher when using MSMA and/or sulfosulfuron but not as expensive as reestablishing bermudagrass. Glyphosate and sulfometuron rate can be a factor in bermudagrass thinning, but not the only factor. The fact that 2004, 2005, and 2006 were droughty years could also be responsible for some decline in bermudagrass density.

Bareground guardrail and shoulder treatments used included various combinations of glyphosate, imazapyr, aminopyralid, and sulfometuron. Good to poor control was achieved from each of the varied treatments. A few of the total vegetation control treatments chosen included

very low herbicide rates. We encourage ODOT crews that may be trying a new treatment combination for the first time to call OSU personnel to check on treatment combinations, rates, and tank mixture calculations. Glyphosate (aquatic) was used to control cattails and vegetation around guardrails with good to fair success.

6.2 Comments and Recommendations from OSU Personnel

Treated acreages for both winter annual and summer johnsongrass control treatments were increased this year in Division Five helping ODOT meet the goals set for the centennial year. We would like to encourage Division Five personnel to continue with their basic winter annual weed control program of glyphosate/2,4-D + AMS and where budgets allow, adding aminopyralid to this treatment. Continuing to use the proper application rates and earlier timings will achieve the best control possible with the selected treatments. Division Five has been applying glyphosate, in some form, to much of its roadsides in March/April (Campaign) and in May/June (Roundup/Oust) for 10 or more years. Even though Division Five has historically used lower than normal rates of glyphosate it is possible that some bermudagrass areas could be thinning. Since comments of this nature have been made by a couple of Division Five personnel this past year it would be a good idea for each facility to monitor the density of roadside bermudagrass/buffalograss and make sure that current treatments are not causing thinning. Temporary yellowing to bermudagrass after an herbicide application, that does not cause permanent thinning, is not a big problem. However, temporary yellowing that turns bermudagrass leaves brown is likely causing stands to thin. It is not advisable to continue year after year with any treatment that causes stand thinning, it may be tolerable for one year but not as an annual program. Thinning bermudagrass roadsides will quickly fill the voids with sandbur, crabgrass, pigweed, kochia, and other opportunistic annual weeds. Alternative treatments of MSMA or sulfosulfuron can provide very good control of johnsongrass and other roadside weeds and have proven to cause less injury to bermudagrass roadsides. Wet years, such as this year, tend to help minimize these problems where as dry years tend to exacerbate the problem.

We would also like to encourage Division Five in continuing to fix each of the spray rigs that continue to have compatibility issues between truck hydraulic systems and sprayer hydraulic motor demands. The hydraulic system overheating continues to compromise accurate herbicide applications as spray system pressures do not stay constant. This would hopefully be a priority item to fix existing spray rigs for trucks that are not scheduled for replacement with the new on-demand (load sensing) hydraulic systems.

Table 5. Summary of Division Five Herbicide Survey Results[1].

Herbicide Common Name (Trade Name)	Herbicide Rate/A[2]	Targeted Weed	Date Started	Date Ended	Acreages Treated		Overall Success (good, fair, poor)
					Average/Facility	Total Division	
glyphosate/2,4-D (Campaign) + aminopyralid (Milestone VM) + AMS	40 oz + 4 oz + 3.2 lb (8) 48.6 oz + 4 oz + 3.4 lb (1) 38 oz + 4 oz + 3.4 lb (2) 44 oz + 3.6 oz + 3.4 lb (1) 37 oz + 3.8 oz + 6.5 lb (1)	winter annuals brome cheat vetch preemergence	3-5-07	4-18-07	422	5,485	good (11) fair (2)
glyphosate/2,4-D (Campaign) + AMS	40 oz + 3.2 lb (8) 38 oz + 3.4 lb (2) 44 oz + 3.4 lb (1) 37 oz + 6.5 lb (1) 48.6 oz + 3.4 lb (1)	winter annuals	3-5-07	4-18-07	492	6,392	good (12) fair (1)
glyphosate (Roundup Pro Concentrate) + sulfometuron (SFM 75)	26 oz + 0.5 oz (1) 10 oz + 0.6 oz (1) 12 oz + 0.5 oz (3) 10 oz + 0.5 oz (1) 10 oz + 0.7 oz (1)	johnsongrass broadleaf weeds annual weeds	5-5-07	6-11-07	743	5,204	good (5) fair (2)
glyphosate (Honcho Plus) + sulfometuron (SFM 75, Oust XP)	8 oz + 0.5 oz (1) 16 oz + 0.5 oz (1) 64 oz + 0.5 oz (1) 14 oz + 0.7 oz (1)	johnsongrass broadleaf weeds silver bluestem	5-2-07	6-12-07	736	2,943	good (3) fair (1)
glyphosate (Roundup Pro Concentrate) + sulfometuron (SFM 75) + diglycolamine salt of dicamba (Vanquish)	12 oz + 0.6 oz + 20 oz (1) 10 oz + 0.5 oz + 16 oz (1)	johnsongrass broadleaf weeds kochia	6-5-07	7-2-07	545	1,089	good (1) fair (1)
MSMA (MSMA)	64 oz (2) 56 oz (1) 49 oz (1) 32 oz (1) ??? (1)	johnsongrass broadleaf weeds other grasses	4-12-07	8-3-07	270	1,619	good (6)
MSMA (MSMA) + sulfometuron (SFM 75)	43 oz + 1 oz (1)	johnsongrass	6-22-07	7-3-07	65	65	good (1)
glyphosate (Honcho Plus)	16 oz (1)	total vegetation control spot treatment	4-24-07	5-1-07	25	25	fair (1)

[1]Total number of responses to survey: 13 of 13.

[2]Numbers in parenthesis refer to the number of county/interstate facilities. A '???' indicates that information was not provided for the production of this report.

7.0 Survey of the Division Six Herbicide Program

7.1 Herbicide Program Survey Results

A total of 9 out of 9 maintenance facilities in Division Six responded to the survey this year. In response to survey questions 2-11 no apparent concerns arose. A meeting was held at Division Six headquarters on September 11, 2007 to solicit comments and opinions from division administrative personnel. Comments and recommendations in this report are based on the surveys and meeting.

Division Six herbicide usage is summarized in Table 6. Winter annual weed control treatments of glyphosate + aminopyralid + AMS were applied to most Division Six roadsides. Winter annual weed control treated acreages were increased this year when compared to the recent past. Weed control results were good as both application rates and timings were met. The addition of aminopyralid to the winter annual weed control treatment provided good control of later germinating summer annual broadleaf weeds. Plans are to continue with this treatment combination in 2008. Division Six roadsides received a partial summer weed control treatment of MSMA to control johnsongrass and various other weeds. MSMA applications were made as broadcast treatments on a spot basis as enough MSMA was purchased to treat approximately half of each county. At the time of the survey deadline some Division Six facilities were still making 2007 MSMA applications consequently summer data for this year is incomplete. Glyphosate + sulfometuron were also used this past summer to control johnsongrass with good success. Dicamba was used to successfully control musk thistle in early summer. Also, a small amount of glyphosate + imazapyr was applied to produce total vegetation control on roadside shoulders with good success. To facilitate the treating of vegetation growing in shoulder seams, cracks, and edges Division Six purchased a Patchen Sprayer Kit this past summer from N-Tech. The Patchen Kit was built and put together by Division Six personnel and replaces the Patchen sprayer destroyed several years ago in a collision.

7.2 Comments and Recommendations from OSU Personnel

This is the first time in several years, since the loss of atrazine, that Division Six has used a division wide winter annual weed control treatment. We would like to encourage Division Six personnel to continue this year's winter annual weed control treatment of glyphosate + aminopyralid + AMS. If Division Six will continue to use glyphosate by itself at the 1 qt. product per acre rate, it is very important that all applications be made before bermudagrass and buffalograss break dormancy and begin to greeenup. With this higher rate of glyphosate being applied to dormant bermudagrass it would be beneficial to set a date each year, based on the winter/spring weather patterns, to stop treatments. This rate of glyphosate should provide very good control of annual ryegrass, and most other winter annual grasses and broadleaf weeds, which continues to increase in agricultural wheat production areas and along roadsides. Division Six treated acreage for control of winter annual weeds is up slightly over previous years. It appears that Division Six will continue with broadcast spot treatments of MSMA to control summer johnsongrass and other weeds. The summer weed control treatments for Division Six are down slightly when compared to past summer johnsongrass control programs as a spot treatment program was begun. The preemergence weed control achieved from the winter application of

aminopyralid should help control many summer annual broadleaf weeds which will be helpful if a summer spot treatment program will be continued. Overall this year treated acreage for all broadcast treatments are up compared to the last 4 years.

Division Six, along with Division Two, has expressed an interest in reviving the herbicide diuron. Diuron 80 WDG (same as the old Karmex), is being placed back on the ODOT Approved Herbicide and Adjuvant List and will be available to purchase and use on future ODOT herbicide contracts. The Diuron 80 WDG (Loveland Ind.) is the only formulation that has an existing label that allows legal roadside use at OSU recommended rates of application. This product will not be on contract until September of 2008, until then ODOT personnel interested in using this herbicide can purchase it from local distributors. The Diuron 80 WDG would be an alternative treatment for the glyphosate/2,4-D + AMS kochia control treatment and a good herbicide to apply with total vegetation control treatments to provide long term preemergence weed control. Recommendations for Diuron 80 WDG use can be found in the new "September 2007 E-958" publication on the Oklahoma State University homepage.

Table 6. Summary of Division Six Herbicide Survey Results[1].

Herbicide Common Name (Trade Name)	Herbicide Rate/A[2]	Targeted Weed	Date Started	Date Ended	Acreages Treated		Overall Success (good, fair, poor)
					Average/Facility	Total Division	
glyphosate (Honcho Plus) + aminopyralid (Milestone VM) +/- AMS	4 pt + 4 oz (1) 2 pt + 3.8 oz (1) 26 oz + 1.6 oz (1) 2 pt + 4 oz (3) 2 pt + 4 oz + 4 lb (2) 2 pt + 3.8 oz + 4 lb (1)	broadleaf musk thistle preemergence annual weeds winter grasses	3-7-07	3-30-07	804	7,237+	good (7) fair (2)
MSMA (MSMA)	2 qt (5)	johnsongrass sandbur	5-11-07	7-27-07	166	831	good (4) fair (1)
glyphosate (Honcho Plus) + sulfometuron (Oust XP)	1 pt + 0.96 oz (1)	johnsongrass	7-7-07	7-7-07	50	50	good (1)
dicamba (Banvel)	1 qt (1)	musk thistle	4-5-07	6-5-07	3	3	good (1)
glyphosate (Honcho Plus) + imazapyr (Arsenal)	2.5% solution + 1% solution	total vegetation control cracks seams	7-1-07	7-1-07	-----	-----	good (1)

[1]Total number of responses to survey: 9 of 9.

[2]Numbers in parenthesis refer to the number of county/interstate facilities. A '???' indicates that information was not provided for the production of this report.

8.0 Survey of the Division Seven Herbicide Program

8.1 Herbicide Program Survey Results

A total of 10 out of 10 maintenance facilities in Division Seven responded to the survey this year. In response to survey questions 2-11 no concerns arose. A meeting was held at Division Seven headquarters on September 10, 2007 to solicit comments and opinions from division administrative personnel and field superintendents. Comments and recommendations in this report will be based on the surveys and meeting.

Division Seven herbicide usage is summarized in Table 7. This year Division Seven applied glyphosate/2,4-D + aminopyralid + AMS to most roadsides to control winter annual weeds and summer annual broadleaf weeds. Winter annual weed control treated acreage increased over the recent past. Weed control results were good as treatment rates were met by most facilities as well as most application dates. Murray County application rates were outside of recommendations and approximately 15% of Division Seven applications were later than recommended. Treatments applied later than recommended may cause unacceptable injury to bermudagrass and predispose bermudagrass to injury from summer johnsongrass control treatments that included glyphosate and/or sulfometuron. This was the first time for Division Seven to use the aminopyralid herbicide and overall most counties and division headquarters personnel had very positive comments on the preemergence summer annual weed control. Their plans include the use of this treatment in 2008. Division Seven used MSMA + sulfosulfuron to control johnsongrass and summer annual weeds with good success this past summer with applications being made to most division roadsides. Application rates were good, except Murray Co., and a very wide window of application was used that started in early April and treatments were still being applied in mid August. This wide window of application is one of the benefits of this treatment combination. Good weed control results can be achieved even at the later dates within this window with little to no increase in bermudagrass injury. Summer johnsongrass control treated acreages increased over the recent past. Clopyralid herbicide was used to control musk thistle successfully this past year. Glyphosate (aquatic) was used with good success to control cattails. Triclopyr amine + surfactant were used to provide fair brush control. Triclopyr ester + oil carrier was applied as both a basal bark treatment and cut stump treatment to control brush species with fair to good results. These techniques require using the correct mixture and applying the herbicide in a specific manner to get good, consistent control of most brush species. We would encourage Division Seven personnel to call OSU personnel in the future to check tank mixes when making these types of applications. Glyphosate + sulfometuron or sulfosulfuron, glyphosate + imazapyr + sulfometuron, and glyphosate + imazapyr were all used on shoulders, slope walls, encroachment, and guardrails to control all vegetation with a wide variety of results. The different levels of success are no doubt due to the wide variety of rates of application used with these herbicides. All of the herbicides used, except sulfosulfuron, could be good components in a total vegetation control treatment. It all boils down to what herbicides will be used and whether they will be applied as a broadcast treatment or with a handgun and what duration of weed control is expected. From this information a combination of herbicides and treatment rate(s) can be selected. We encourage Division Seven personnel to contact OSU personnel for assistance with these selected treatments, rates, and tank mix calculations.

8.2 Comments and Recommendations from OSU Personnel

To help meet 2007 centennial goals, Division Seven increased the amount of herbicide treated acreage for each of the two main broadcast treatments compared to the past several years. Also, for the first time in several years, Division Seven had a very consistent winter annual weed control treatment followed by a summer johnsongrass control treatment over the entire division. We would like to encourage Division Seven to continue with these efforts in 2008. Between these two treatments, they should take care of most of the weed problems found along Division Seven roadsides whether they are grassy or broadleaf weeds having annual or perennial life cycles. At their discretion, and prior to any 2008 herbicide applications, we would like to encourage Murray Co. to call OSU personnel to confirm treatment rates and tank mixes as this past year they were consistently outside of recommendations. OSU personnel are a resource of information and guidance for ODOT personnel and we encourage all ODOT personnel to take advantage of this resource.

Good news for the Division Seven summer johnsongrass control treatment of MSMA + sulfosulfuron. In mid 2006 it became apparent that the EPA was targeting MSMA for a denial to reregister. This would have quickly stopped MSMA for any future ODOT use. This situation has been monitored closely by OSU and currently we can report that the supposed “fast-track” denial has slowed down significantly and in all likelihood MSMA will be around for several more years. How long MSMA will be around is still unknown but obviously the situation will continued to be monitored. Until further notice we would encourage all ODOT field divisions, whom plan on using MSMA in their summer johnsongrass weed control programs, to annually buy what they need for one season. This purchasing practice should insure that there will be no problems concerning disposal if the EPA does deny reregistration during any given calendar year. OSU personnel still recommend that ODOT does not stock up and buy a two or three year supply of this or any other herbicide.

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Table 7a. Summary of Division Seven Herbicide Survey Results[1].

Herbicide Common Name (Trade Name)	Herbicide Rate/A[2]	Targeted Weed	Date Started	Date Ended	Acreages Treated		Overall Success (good, fair, poor)
					Average/Facility	Total Division	
glyphosate/2,4-D (Campaign) + aminopyralid (Milestone VM) + AMS	3.3 pt + 0.47 oz + 5.2 lb (1) 2 pt + 4 oz + ??? (2) 2 pt + 4 oz + 5.1 lb (2) 2.7 pt + 4 oz + 5.1 lb (2) 2 pt + 4 oz + 0.72 lb (1) 2 pt + 4 oz + 4.2 lb (1)	broadleaf weeds preemergent musk thistle winter annuals	2-21-07	3-28-07	861	7,753	good (9)
glyphosate/2,4-D (Campaign) + glyphosate (Roundup Pro Concentrate) + aminopyralid (Milestone VM) + AMS	1.4 pt + 7.3 oz + 1.4 oz + ??? (1)	winter annuals winter rye broadleaf weeds	2-27-07	3-16-07	810	810	good (1)
MSMA (MSMA) + sulfosulfuron (Outrider)	2 qt + 1.33 oz (3) 1.75 qt + 1.33 oz (2) 2 qt + 1.0 oz (3) 2.4 qt + 1.6 oz (1)	johnsongrass broadleaf weeds sandbur	4-5-07	8-8-07	799	7,193	good (9)
MSMA (MSMA)	2 qt (1)	johnsongrass crabgrass	6-14-07	8-17-07	700	700	good (1)
clopyralid (Transline) + surfactant	10 oz + 0.25% (1) 10.5 oz (1)	musk thistle spot and broadcast treatments	5-11-07	5-11-07	75	150+	good (2)

[1]Total number of responses to survey: 10 of 10.

[2]Numbers in parenthesis refer to the number of county/interstate facilities. A '???' indicates that information was not provided for the production of this report.

Table 7b. Summary of Division Seven Herbicide Survey Results[1].

Herbicide Common Name (Trade Name)	Herbicide Rate/A[2]	Targeted Weed	Date Started	Date Ended	Acreages Treated		Overall Success (good, fair, poor)
					Average/Facility	Total Division	
triclopyr ester (Garlon 4) + oil carrier (basal bark and cut stump treatment)	2 gal (1) 1 gal (1) 4:1 (oil to herbicide) (1) 0.83 gal (1)	brush control	1-2-07	6-6-07	2.1	8.5+	good (2) fair (2)
triclopyr amine (Garlon 3A) + surfactant	5 gal (1)	brush control	5-14-07	5-14-07	0.5	0.5	fair (1)
glyphosate (Roundup Pro Concentrate, Honcho) + sulfometuron (Oust XP)	2 qt + 4 oz (1) 3 qt + 4 oz (1) 2 qt + 2 oz (1) 3% solution + 2 oz (1) 2 gal + 6 oz (1)	total vegetation control encroachment slope walls guardrails	4-2-07	8-7-07	28	140	good (3) fair (1) poor (2)
glyphosate (Roundup Pro Concentrate) + sulfosulfuron (Outrider)	1 gal + 1 oz	total vegetation control spot treatment	4-16-07	4-27-07	-----	-----	good (1)
glyphosate (Roundup Pro Concentrate) + imazapyr (Arsenal) + sulfometuron (Oust)	1 gal + 1 qt + 2 oz (1) 3% solution + 0.5% solution + 2 oz /A (1)	total vegetation control spot treatment	5-2-07	8-17-07	9	17.5+	good (2)
imazapyr (Arsenal) + sulfometuron (Oust)	2 qt + 2 oz (1)	total vegetation control encroachment	6-12-07	6-20-07	35	35	good (1)
glyphosate, aquatic (Aquastar) + surfactant	1.5 gal + 2 qt (1)	cattails	5-3-07	5-3-07	3	3	good (1)

[1]Total number of responses to survey: 10 of 10.

[2]Numbers in parenthesis refer to the number of county/interstate facilities. A '???' indicates that information was not provided for the production of this report.

9.0 Survey of the Division Eight Herbicide Program

9.1 Herbicide Program Survey Results

A total of 10 out of 10 maintenance facilities in Division Eight responded to the survey this year. In response to survey questions 2-11 only a single concern arose. In response to survey question 5 which asked "How often is the herbicide spray truck calibrated?", the response was that 4 out of 10 facilities only calibrated their spray rigs once per year. Minimum OSU recommendations are to calibrate all broadcast spray rigs once before each broadcast spray treatment. For most ODOT facilities that means a calibration procedure should be done before you spray for winter annual weeds (glyphosate/2,4-D + AMS) and again, prior to summer weed control treatments (glyphosate or MSMA + sulfometuron or sulfosulfuron). The completed calibration forms would then become a part of the permanent record for the subsequent herbicide applications. A meeting was held at Division Eight headquarters on September 4, 2007 to solicit comments and opinions from division administrative personnel. Comments and recommendations in this report are based on the surveys and meeting.

Division Eight herbicide usage is summarized in Table 8. To provide winter annual weed control to Division Eight roadsides this past year, treatments of glyphosate/2,4-D + AMS & glyphosate/2,4-D + aminopyralid + AMS were used on most division roadsides. A little more than ½ of each county area was treated with the aminopyralid tank mixture which gave each county a good opportunity to compare the two different treatments. Overall, both of these treatment options produced good results as recommended application rates and most timings were met. As in past years about 15% of the winter annual weed control treatments are being applied later than recommended. If treatments of this nature are applied later than recommended, they may cause unacceptable injury to bermudagrass if spring green-up is too far along. Treated acreage increased for all broadcast winter annual weed control treatments. Division Eight used the centennial year recommendation of a glyphosate + sulfosulfuron summer johnsongrass control treatment with good success. Herbicide rates and application timings were good for most of the counties. Because of the use of sulfosulfuron in the summer treatment and the safety that comes with this particular herbicide Division Eight crews were able to continue summer johnsongrass treatments well into August. Because of all the rainfall in late May and June, having the ability to safely spray the glyphosate + sulfosulfuron treatments later in the summer was a benefit. Treated acreages increased for all broadcast summer johnsongrass control treatments. Clopyralid was used successfully to control musk thistle. Glyphosate, with or without sulfometuron, was used to provide total vegetation control around guardrails and signs with fair to good success. Glyphosate + bromacil were used for total vegetation control with poor results. Triclopyr amine + oil were used to provide good brush control when applied as a foliar treatment in mid summer.

9.2 Comments and Recommendations from OSU Personnel

This past centennial year Division Eight continued with a very sound herbicide program consisting of glyphosate/2,4-D + AMS or glyphosate/2,4-D + aminopyralid + AMS applied in late winter followed by glyphosate + sulfosulfuron applied in early summer. As one of the goals for the centennial year, treated acreages for each of these broadcast treatments were increased over previous years. We would like to encourage Division Eight to continue this effort as this program

will continue to supply both short-term benefits (weed control and mowing reductions) and long-term benefits (release of bermudagrass and other beneficial grasses and reduced weed populations). A few Division Eight crews need to continue to work on proper application timings. OSU publication E-958 (September 2007) has the optimum dates published for reference. If ever in doubt on when to start or stop a seasonal spray treatment we encourage ODOT personnel to consult directly with OSU personnel.

Division Eight administration is looking into contracting herbicide applications along state highways within Tulsa County. This effort will likely be more of a fence-to-fence program instead of primarily a clear zone spray program. Division Eight will need to tackle two unique problems over the existing herbicide contracts currently being used in Oklahoma, Canadian, and Cleveland counties. Those problems, or concerns, will be that of managing both tall fescue and/or bermudagrass roadsides and managing roadsides in and around the many tree plantings in the Tulsa area. OSU personnel are available to assist in creating an herbicide contract for this maintenance area.

Table 8. Summary of Division Eight Herbicide Survey Results[1].

Herbicide Common Name (Trade Name)	Herbicide Rate/A[2]	Targeted Weed	Date Started	Date Ended	Acreages Treated		Overall Success (good, fair, poor)
					Average/Facility	Total Division	
glyphosate/2,4-D (Campaign) + aminopyralid (Milestone VM) + AMS	2 pt + 4 oz + 5 lb (10)	broadleaf weeds winter annuals preemergence vetch/clover	3-5-07	4-17-07	423	4,225	good (9) fair (1)
glyphosate/2,4-D (Campaign) + AMS	2 pt + 5 lb (10)	winter annuals broadleaf weeds	3-5-07	4-17-07	313	3,125	good (9) fair (2)
glyphosate (Roundup Pro Concentrate) + sulfosulfuron (Outrider)	19 oz + 1.3 oz (8) 32 oz + 1.3 oz (1) 19 oz + ??? (1)	johnsongrass broadleaf weeds	5-31-07	8-10-07+	582	5,817	good (10)
glyphosate (Roundup Pro Concentrate) + sulfometuron (Oust XP)	19 oz + 1 oz (1)	johnsongrass broadleaf weeds	6-25-07	6-25-07	100	100	fair (1)
clopyralid (Transline) + surfactant	1 oz /10 gal water (1)	musk thistle	4-9-07	4-10-07	-----	-----	good (1)
glyphosate (Roundup Pro Concentrate) + sulfometuron (Oust XP, SFM 75)	38 oz + 2 oz (1) 3% solution + 5.3 oz (1)	guardrail sign total vegetation control	6-12-07	8-10-07+	34	68	good (2)
glyphosate (Roundup Pro Concentrate)	2% solution (1)	guardrail total vegetation control	5-14-07	5-14-07	0.75	0.75	fair (1)
glyphosate (Roundup Pro Concentrate) + bromacil (Opti-Kill)	2 qt + 3 gal (1)	total vegetation control bermudagrass encroachment	6-5-07	6-6-07	12	12	poor (1)
triclopyr amine (Garlon 3A) + oil	1:3 ratio	brush	7-17-07	7-26-07	4.3	4.3	good (1)

[1]Total number of responses to survey: 10 of 10.

[2]Numbers in parenthesis refer to the number of county/interstate facilities. A '???' indicates that information was not provided for the production of this report.

10.0 Statewide Summary of ODOT Herbicide Programs

I think it is safe to say that most of Oklahoma experienced a very wet year. In August we even had an intact hurricane, Erin, cross through southern and central Oklahoma dropping record amounts of rain and making the national news. With the large amount of flooding rains in 2007 it says a great deal about the quality of ODOT roadsides in that there wasn't more flooding damage to road surfaces. Flooding waters that cross state highways possess a great deal of energy that can erode roadsides and ultimately damage road surfaces. One of the primary goals of ODOT's integrated roadside vegetation management program is to promote an erosion resistant groundcover (bermudagrass) that can withstand damage and keep road surfaces intact. While some roadsides did sustain water/erosion damage, there is no doubt it was minimized due to the quality of roadside grasses. Oklahoma's centennial year will go down in the record books as a very wet year and was probably just what the state needed to look best for her centennial. While the wet conditions caused problems with scheduling of mowing and herbicide applications, they provided ideal growing conditions for both desirable grasses and weeds. Overall in 2007 ODOT field divisions treated more acreage with selective broadcast herbicide treatments than they have in more than 10 years. Most 2007 selective broadcast treatments for winter annual weed control (64,010 acres, Table 9) and summer johnsongrass control (57,484 acres, Table 9) were very successful. With successful weed control being achieved in a year with ideal growing conditions, it is likely that roadside bermudagrass, buffalograss, and other beneficial grasses were also able to produce a great deal of growth and development. Increasing the growth and density of beneficial roadside grasses has long term benefits of decreasing weed populations and minimizing maintenance requirements which are the goals of any integrated roadside vegetation management program.

The 2007 centennial year brought new challenges for ODOT roadside vegetation managers other than the weather. In the fall of 2006 ODOT Executive staff members put together four centennial goals with respect to weed control program efforts for this year. The goals were; 1.) statewide winter annual weed control treatment, 2.) statewide summer johnsongrass control treatment, 3.) statewide total vegetation control treatment around guardrails, signs, shoulders, and 4.) statewide brush control efforts around bridges and other concrete structures. In 2007 all ODOT personnel were asked for an "Elevated Level of Service" and were advised additional funds were available, if needed, to meet the new centennial goals. From the herbicide surveys and ODOT meetings there is no doubt that each of the field divisions put forth extra effort this year regarding their herbicide programs and herbicide equipment. The acreages treated for each field division (Table 10.), for the main broadcast treatments (goals 1 & 2), increased for every field division. Probably more important than increasing the acreages is that for the first time in several years all field divisions applied both a winter annual weed control treatment and summer johnsongrass control treatment in 2007. This should have produced a more consistent, uniform statewide weed control effort when traveling from division to division. Increasing treated acreages and producing a more uniform herbicide program were both main goals of the "Elevated Level of Service". While some field divisions did increase weed control efforts with respect to centennial goals 3 & 4, there was not a documented, consistent statewide increase for all divisions. Individual field division efforts with respect to centennial goals 3 & 4 may be found in Tables 1-8 within this report.

As many of the field divisions saw their herbicide spray programs change during the 2007 centennial year, one needs to ask the question of whether or not the changes that were made will or can be sustained. The new herbicide aminopyralid was an additional cost over existing herbicide costs and may be difficult to sustain for some divisions. We encourage all ODOT field divisions to make sure they understand the benefits of each herbicide used this past year and weight those benefits against the additional costs. OSU personnel are always available to discuss individual field division herbicide program treatments so that informed decisions can be made to extend weed control budgets as far as possible. Also this past year the centennial summer johnsongrass control treatment of glyphosate + sulfosulfuron included higher rates and higher treatment costs when compared to alternative treatments used by many field divisions in the past. Those field divisions that choose to use the centennial recommendations are encouraged to continue their use if 2008 budgets will allow. If field divisions cannot sustain the more expensive treatment, we encourage them to contact OSU for less expensive alternatives. The luxury, or confusion (its all in how you look at it), of selecting a summer johnsongrass treatment comes from the wide range of treatment choices ranging from $5.00/acre to close to $15.00/acre. Each of the three major summer johnsongrass control treatments have specific benefits and shortcomings. The good thing is there should be a treatment that fits the needs, desires, and budgets of each of the field divisions.

Part of the 2007 increased herbicide effort consisted of the first-year use of aminopyralid (trade name Milestone VM) by 6 of 8 field divisions (Table 9.). In its first year, aminopyralid was applied to over 29,638 acres of Oklahoma state highway roadsides. One thing to keep in mind is that aminopyralid does not show up as increased acreage as nearly all aminopyralid use was as a tank-mix partner with traditional winter annual weed control treatments of glyphosate + AMS or glyphosate/2,4-D + AMS. Aminopyralid, as applied in 2007, was added to the tank-mix to provide preemergence control of summer annual broadleaf weeds. This soil-active herbicide has proven to be very effective in past OSU roadside research trials, but this year, because of the excessive rainfall, raised some concern. Traditionally, herbicides that are soil-active will provide residual weed control for several months following application. Under conditions of excessive rainfall the length of residual control can be reduced significantly, minimizing the benefit from the herbicide. While there were a few ODOT comments, less than 10%, which alluded to loss of weed control in early summer, by far most ODOT comments were that the aminopyralid addition controlled broadleaf weeds well into the summer months as expected. One of the major benefits of applying a late Feb.-March treatment of aminopyralid to control summer annual broadleaf weeds is reducing the potential to damage adjacent sensitive agricultural and horticultural crops. The late winter/early spring application window is safer as opposed to traditional May or June postemergence broadleaf weed control application windows. Through additional 2007 research trials and observing ODOT aminopyralid application results it appears that aminopyralid will only provide suppression of kochia and little to no control of pigweeds. While this is disappointing that aminopyralid won't control these two very troublesome summer annual broadleaf weeds, it did provide a very broad spectrum of control of many other annual broadleaf weed species. Another benefit of the aminopyralid treatments, as applied last year, is very high levels of control of the state noxious weeds (musk thistle and scotch thistle). In 2007, ODOT had an unprecedented effort in controlling both state noxious weeds, musk thistle and scotch thistle, on over 29,638 acres of state highway roadsides in six of eight field divisions. ODOT efforts (acreages, treatments, costs, etc.) to comply with the Oklahoma Noxious Weed Law have been

passed on to the Oklahoma Department of Agriculture, Food, and Forestry (ODAFF), the state agency in charge of enforcing the noxious weed law. OSU is aware that aminopyralid is an expensive herbicide and in all likelihood the costs per acre will not decrease significantly in the near future. Because of the unique characteristics of the aminopyralid chemistry, it does provide answers to weed control problems that ODOT personnel have experienced in the past few years. OSU is in the process of securing a small amount of aminopyralid to give to Field Divisions One and Two so they can spray one tank load in 2008 to evaluate the benefits of the new herbicide.

ODOT broadcast herbicide spray rigs all are designed to apply a specific amount of herbicide to each acre treated to produce the desired weed control results. Most ODOT spray trucks (excluding the 3 computer injection spray rigs) are calibrated based on a predetermined carrier rate (GPA), measured flow rate (GPM), and measured spray width (feet). The final piece of the calibration puzzle is to drive the spray truck at the calculated ground speed (MPH). At this point, ODOT crews have done all they can to apply an accurate rate of their herbicide. Unfortunately life is not that simple. During applications, and different times of the day, spray widths likely change which will cause an ODOT crew to make an accurate specific change in ground speed to maintain consistent and accurate herbicide rates per acre. For years ODOT has used Calc-An-Acre's to digitally monitor the spray truck ground speed with varying degrees of success. The Calc-An-Acre units were okay, however, the cable/magnet/sensor and wiring harnesses that were required were not reliable. In December 2006 OSU notified ODOT of a new sensor (Astro II GPS sensor) being supplied with the Calc-An-Acre units that relied on a dashboard mounted GPS receiver. The new sensor would be independent of the truck and require no undercarriage wiring, all of which would make it more dependable. Under OSU's recommendations most field divisions purchased either new Calc-An-Acres with the new Astro II GPS sensor or retrofitted existing Calc-An-Acres with the new GPS sensor this past year. In conversations with the field divisions the new Astro II GPS sensors have been working very well and should allow ODOT crews to make specific and accurate changes in spray truck speed at their discretion. This is a relatively inexpensive upgrade on the spray equipment and it is critical for each ODOT spray truck to include an accurate, working Calc-An-Acre unit to calibrate and apply herbicides under the application criteria used today. ODOT crews are encouraged to call OSU personnel if they have any questions about the calibration and or use of the new Astro II GPS sensors.

ODOT personnel around the state were notified of the EPA-MSMA reregistration situation on September 26, 2006 in an e-mail from the OSU Extension Pesticide Coordinator. MSMA is an herbicide recommended by OSU, and used by ODOT, to control summer johnsongrass and broadleaf weeds. As per normal EPA procedures, all herbicides must be periodically reregistered through the EPA. The EPA decided that MSMA would be denied the opportunity of reregistration because of new evidence that MSMA might be a potential ground water contaminant. The actions that the EPA had taken were fairly shocking to the market segments that still routinely use MSMA, and other organic arsenical herbicides. In conversations with EPA officials during October 2007 it appeared that MSMA, though still under investigation, would likely not see its EPA registration denied in the near future. MSMA products that met normal state registration criteria would continue to be legally sold. However, in December 2007 EPA recommendations to manufacturers were to voluntarily cancel all registrations and agree to

an 18-month phase out period for all organic arsenical herbicides. At the time of the writing of this annual report the future of MSMA is very much up in the air and will have to be monitored very closely. In the future there may be additional public comment periods that we could encourage ODOT personnel to participate in as MSMA still continues to be an important herbicide for some of the ODOT field divisions. OSU will keep ODOT informed on this issue. Until further notice ODOT field divisions should not purchase MSMA in quantities that cannot be used in a single growing season.

During the 1st session of the 51st legislature (2007) SB-575 was introduced by Senator Schulz that was attempting to require the Oklahoma Department of Agriculture, Food, and Forestry to designate all hormone herbicides as state restricted-use. The bill was tabled in 2007 with no activity during the last session but likely be back in 2008. Current hormone herbicides used annually by ODOT include; glyphosate/2,4-D (Campaign), 2,4-D (2,4-D), diglycolamine salt of dicamba (Vanquish), dicamba (Banvel), dicamba/diflufenzopyr (Overdrive), triclopyr (Garlon 4 & 3A), clopyralid (Transline), aminopyralid (Milestone VM), and picloram (Tordon K). Of these products, only the Tordon K is currently a federal and state restricted-use herbicide. There are hundreds more commercial herbicides used in Oklahoma each year that are hormone herbicides and would fall under the regulations of this legislation. Senator Schulz, and several of his Senate Ag committee members are very concerned that cotton production sites are not currently protected from drift damage from hormone herbicides. During 2007 there were a few public meetings where industry, private, and governmental personnel discussed what future changes there should be in ODAFF Pesticide Laws and Regulations to make the current situation better. There are a wide variety of opinions, both pro and con, from various groups on whether making all hormone herbicides state restricted-use will help the situation. The specific SB-575 that was tabled in 2007 will, in all likelihood, resurface in 2008. It will be important for all concerned to monitor its progress during the fall of 2007 by attending and participating at any other future meetings. It may be a good idea for ODOT, as a single entity, to formulate an official opinion on this legislation as in all likelihood some form of this bill will pass or form the basis for a future ODAFF rule change. At ODOT's discretion, we would recommend that ODOT have a representative at future meetings on SB-575 because ODOT currently uses several hormone herbicides which are very important to current and future weed control efforts along the state highway system. OSU will continue to attend meetings of this nature but does not have the authority to present information on behalf of ODOT. Currently because of the investment ODOT has made in the area of applicator training and herbicide research the affects to existing ODOT spray programs, should hormone herbicide become state restricted-use, should be minimal.

In September 2007 the new statewide herbicide contract was completed and on-line for ODOT personnel to review and use. The goal is to try and keep this annual contract on a September to September time frame so that there will not be contract changes occurring during herbicide application seasons. This year the most notable changes were a significant price drop in the cost of sulfometuron (Oust XP) and metsulfuron methyl (Escort XP) herbicides. Not only did the price drop by nearly 50%, the Dupont herbicides, Oust XP and Escort XP, were bid lower than their generic counterparts. Roundup Pro Concentrate continued to fall in price slightly while generic glyphosate (Honcho Plus) increased slightly in cost. This is the first time generic glyphosate products have increased in price since they entered the market several years ago. This suggests that generic glyphosates may have reached market bottom prices with some type of

price stabilization expected in the future. The cost difference now between Roundup Pro Concentrate and generic Honcho Plus is less than ever and should be considered by each of the field divisions that have been using generic glyphosates. The advantages in Roundup Pro Concentrate over Honcho Plus is a 1 hour versus 6 hour rain fastness, a superior surfactant is included in Roundup Pro Concentrate, and a higher degree of Manufacturer product support. For several years ODOT has been purchasing Royal ammonium sulfate (AMS), from Estes Chemical, to mix with winter annual weed control programs of glyphosate/2,4-D or glyphosate alone. This year the AMS product on the contract will again be supplied by Estes Chemical, however the brand name has changed to APF ammonium sulfate. APF AMS will be used exactly as the Royal AMS product was used in the past. No bids were submitted for glyphosate/2,4-D (Campaign) in 30 gallon containers so this specific herbicide container size will not be available this year on the contract. Also, due to herbicide contract deadlines Diuron 80 WDG (manufactured by Loveland Industries for UAP) herbicide (same as the old Karmex) was not placed on the statewide herbicide contract for this year. It will however be placed on the ODOT Approved Herbicide and Adjuvant List (Table 11.) in the fall of 2007. The plans are to have this specific diuron formulation on the contract for next year, however, if ODOT personnel would like to use it during the late winter/spring of 2008 it could be purchased directly from the distributor (UAP, Randall Parrish, P.O. Box 557, Monticello, AR 71657, phone: 870-367-8561). New herbicides and adjuvants that have recently been placed on the ODOT AHAL are; MSM E-Pro (metsulfuron methyl), SFM E-Pro (sulfometuron), Garlon 4 Ultra (triclopyr ester), APF ammonium sulfate, Habitat (imazapyr aquatic), and Diuron 80 WDG (Diuron). The ODOT AHAL is an ongoing annual project item that OSU, in cooperation with the ODOT Maintenance Division, updates to keep quality, useful herbicides available to ODOT personnel. We encourage all ODOT personnel to contact OSU about requests or recommendations on changes to either the annual ODOT AHAL or the DCS Statewide Herbicide Contract.

OSU personnel have produced two new training documents during 2007 that ODOT personnel should find useful. The first document is a new version of OSU publication E-958 titled “Suggested Maintenance Practices for Roadside Weed and Brush Problems, September 2007”. This is a publication ODOT personnel should be familiar with as it includes newly updated herbicide treatment recommendations for ODOT. This new publication is available on-line but be sure to download the “September 2007” version as there are now several old versions of E-958 on-line. The second publication for 2007 is a new document that ODOT personnel should find useful each year when they calibrate or do routine maintenance on their broadcast spray rigs. The new OSU publication L-322 entitled “Boomless Roadside Herbicide Sprayer Assessment Guide” was distributed throughout ODOT in the fall of 2007 and was meant to be a hands-on training guide to help facilitate sprayer equipment maintenance. This document is also available on-line. ODOT personnel will receive training on both of these new documents during 2008 ODOT Herbicide Applicator Continuing Education Workshops (Feb.-March 2007).

This report is produced annually as one of the items from the cooperative OSU/ODOT Project: 2156 Roadside Vegetation Management Training & Consultation. This report is generated using three types of data; annual written survey of all county/interstate maintenance facilities, annual meeting with field division administrative personnel, and personal observations by OSU personnel. We would like to encourage all ODOT personnel to include as much of their annual herbicide activities into the surveys and meetings as possible. This past year many of the

field surveys were very difficult to understand as information was incomplete. If ODOT county/interstate maintenance personnel are keeping good, timely records of their herbicide activities as required by law, the OSU survey should be no more than a summation of these annual treatment records. Training for filling out future surveys will be conducted in 2008 ODOT Herbicide Applicator Continuing Education Workshops. We hope that ODOT personnel find this annual survey and report to be a useful tool in documenting the ODOT herbicide efforts of each of the field divisions. This gives each field division an opportunity to see what other field divisions are doing as well as keeping ODOT personnel in Oklahoma City informed of the specifics of the various herbicide programs used annually by ODOT field divisions.

On a final note, ODOT spray crews statewide should be congratulated on the effort they put forward each year to control weeds along the state highway system. Their efforts make the clear zone look very respectable and produce many benefits that have been mentioned throughout this report. While everyone should strive to improve both the quality and quantity of their herbicide efforts, ODOT continues to treat roadsides across the entire state using a great deal of professionalism. This is manifested in the fact that in 2007, while ODOT treated nearly 124,000 acres of roadsides with herbicides, they had only 2 formal complaints filed against them with the Oklahoma Department of Agriculture, Food, and Forestry (ODAFF). In 2007 ODOT should also be congratulated on treating nearly 30,000 acres of roadsides to control the states noxious weeds, musk thistle, and scotch thistle (these areas were treated with aminopyralid, dicamba/diflufenzopyr, and clopyralid). In recent conversations with ODAFF, they were unaware of this significant effort and once supplied the data were very impressed. ODAFF has plans in 2008 to place a higher degree of priority on enforcing the Oklahoma Noxious Weed Law. While this law has been lower priority the past few years, ODAFF has plans of more noxious weed inspections in 2008 which will no doubt be followed by letters of violation where musk thistle and scotch thistle are found. ODOT has positioned itself well because of this years weed control efforts but should be prepared for musk thistle control efforts in 2008 because of the increase ODAFF enforcement priority.

Table 9. Summary of 2007 ODOT herbicide treatments, target weeds and total acres treated with herbicides in Oklahoma.

Herbicide Treatment	Target Weed	Divisions Using Treatment(s)	Total Acreage Treated
glyphosate +/- 2,4-D +/- AMS +/- Others	winter annual weeds	1, 2, 3, 4, 5, 8	34,372
glyphosate +/- 2,4-D +/- aminopyralid +/- AMS +/- Others	winter annual weeds (including musk and scotch thistle)	3, 4, 5, 6, 7, 8	29,638
glyphosate + sulfometuron	johnsongrass and summer annual weeds	1, 2, 4, 5, 6, 8	13,870
glyphosate + sulfosulfuron	johnsongrass and summer annual weeds	1, 2, 3, 4, 8	30,906
glyphosate + imazapic	johnsongrass and summer annual weeds		0
MSMA +/- sulfometuron, sulfosulfuron, imazapic	johnsongrass and summer annual weeds	2, 4, 5, 6, 7	12,708
glyphosate (alone) bromacil/diuron glyphosate + imazapyr glyphosate + imazapyr + sulfometuron glyphosate + diuron	johnsongrass and summer annual weeds total vegetation control bare ground sign-posts guardrails shoulders, cracks	1, 2, 3, 4, 5, 6, 7, 8	2,036
bromacil bromacil/diuron	total vegetation control		0
triclopyr ester diglycolamine salt of dicamba	general broadleaf weed control	2	50
dicamba/diflufenzopyr +/- Others	musk thistle	6	3
clopyralid +/- Others	musk thistle	4, 7, 8	164
triclopyr ester + diesel	basal brush control	1, 4, 7	11
picloram + triclopyr ester	foliar brush control		0
triclopyr ester or amine	foliar brush control	7, 8	5
imazapyr (aquatic)	aquatic vegetation control		0
glyphosate (aquatic)	aquatic vegetation control	5, 7	13
triclopyr amine	aquatic vegetation control		0
Total			123,776

Table 10. Comparison of herbicide acreages treated in 2004, 2005, 2006 and 2007 for the more common broadcast treatments and total acres treated by division.

ODOT Field Division	Year	Herbicide Treatments						Total Acres Treated with Selected Herbicide Applications
		glyphosate +/- 2,4-D +/- AMS (winter annual weed control)	glyphosate +/- 2,4-D +/- aminopyralid +/- AMS (winter annual weed control)	glyphosate + sulfometuron (johnsongrass control)	glyphosate + sulfosulfuron (johnsongrass control)	MSMA +/- sulfometuron/ sulfosulfuron (johnsongrass control)	glyphosate (johnsongrass control)	
1	2004	5,662	0	0	16	0	168	5,846
	2005	5,892	0	64	309	0	42	6,307
	2006	1,561	0	3,639	2,287	0	507+	7,994
	2007	5,574	0	540	5,547	0	0	11,661
2	2004	0	0	2,183	0	216	0	3,957
	2005	0	0	6,282	0	650	113	12,907
	2006	0	0	2,901	0	1,299	531	4,731
	2007	8,486	0	1,899	8,818	1,687	0	20,890
3	2004	6,983	0	0	6,924	0	0	13,907
	2005	7,724	0	0	7,542	0	0	15,266
	2006	660	0	0	2,713	0	0	3,373
	2007	5,901	2,484	0	6,090	0	723	15,198
4	2004	5,682	0	4,023	0	838	0	10,543
	2005	5,234	0	5,612	0	0	0	10,846
	2006	688	0	5,977	0	0	0	6,665
	2007	4,894	1,644	2,095	4,634	43	0	13,310
5	2004	9,795	0	3,246	0	687	1,450	15,176
	2005	8,775	0	7,317	0	2,444	1,053	19,589
	2006	0	0	7,700	0	2,010	240	9,950
	2007	6,392	5,485	9,236	0	1,684	0	22,797
6	2004	0	0	2,945	250	0	0	7,353
	2005	1,450	0	5,481	0	0	0	7,748
	2006	0	0	6,054+	0	0	0	6,054
	2007	0	7,237	0	0	1,401	0	8,638
7	2004	4,206	0	0	1,230	3,710	282	12,833
	2005	7,074	0	0	0	8,126	0	15,309
	2006	534	0	0	0	3,489	0	4,023
	2007	0	8,563	0	0	7,893	0	16,456
8	2004	5,124	0	600	0	0	0	5,724
	2005	6,254	0	4,230	0	0	100	10,584
	2006	5,309	0	1,700	3,275	0	0	10,285
	2007	3,125	4,225	100	5,817	0	0	13,267
All Divisions	2004	37,450	0	12,997	8,420	5,451	1,900	66,218
	2005	42,403	0	28,986	7,851	11,220	1,308	91,768
	2006	8,752	0	27,971	8,275	6,798	1,278	53,074
	2007	34,372	29,638	13,870	30,906	12,708	723	122,217

Table 11. 2007 ODOT Approved Herbicide and Adjuvant List with product type, common name(s), brand names, and manufacturers.

Product Type	Active Ingredient(s) Common name	Brand Name	Manufacturer/ Distributor
herbicide	Aminopyralid	Milestone VM	Dow AgroSciences
herbicide	Clopyralid	Transline	Dow AgroSciences
herbicide	Dicamba	Banvel	Microflo
herbicide	Dicamba/diflufenzopyr	Overdrive	BASF
herbicide	Diglycolamine salt of dicamba	Vanquish	Syngenta/Nufarm
herbicide	Diuron	Diuron 80 WDG	Loveland Industries
herbicide	Fluroxypyr	Vista	Dow AgroSciences
herbicide	Fosamine	Krenite S	Dupont
herbicide	Glyphosate	Honcho	Monsanto
	Glyphosate	Honcho Plus	Monsanto
	Glyphosate	Mirage	UAP-Loveland Products
	Glyphosate	Mirage Plus	UAP-Loveland Products
herbicide	Glyphosate	Roundup Pro Concentrate	Monsanto
herbicide	Glyphosate (aquatic)	AquaMaster	Monsanto
	Glyphosate (aquatic)	AquaStar	Albaugh
herbicide	Glyphosate/2,4-D	Campaign	Monsanto
herbicide	Imazapic	Plateau	BASF
herbicide	Imazapyr	Arsenal	BASF
	Imazapyr	Imazapyr 2 SL	Veg. Mgmt., LLC
herbicide	Imazapyr (aquatic)	Habitat	BASF
herbicide	Imazapyr/diuron	Sahara	BASF
herbicide	Metsulfuron methyl	MSM E-Pro	Etigra
	Metsulfuron methyl	Escort XP	Dupont
	Metsulfuron methyl	Metsulfuron methyl	Veg. Mgmt., LLC
herbicide	MSMA	MSMA 6.0 Plus	Drexel
herbicide	Picloram	Tordon K	Dow AgroSciences
herbicide	Sulfometuron	SFM E-Pro	Etigra
	Sulfometuron	Oust XP	Dupont
	Sulfometuron	SFM 75	Veg. Mgmt., LLC
herbicide	Sulfometuron/metsulfuron	Oust Extra	Dupont
herbicide	Sulfosulfuron	Outrider	Monsanto
herbicide	Triclopyr amine	Garlon 3A	Dow AgroSciences
	Triclopyr amine	Triclopyr 3A	Microflo
herbicide	Triclopyr ester	Garlon 4	Dow AgroSciences
	Triclopyr ester	Garlon 4 Ultra	Dow AgroSciences
herbicide	Triclopyr ester	Pathfinder II (RTU)	Dow AgroSciences
liquid non-ionic surfactant (adjuvant)		SurfKing	Estes
		Red River 90	Red River Specialties
		Timberland 90	UAP
		AD-Spray 80	Helena
liquid non-ionic surfactant aquatic (adjuvant)		Aqua King	Estes
		Red River 90	Red River Specialties
		Timberland 90	UAP
		Induce	Helena
liquid drift control (adjuvant)		Detain II	Estes
		ChemTrol	UAP
		Pointblank WM	Helena
dry ammonium sulfate (adjuvant)		Royal AMS	Estes
		APF AMS	Estes
dry ammonium sulfate w/drift control (adjuvant)		Array	Estes
		Dry Poly Wet	Red River Specialties
		StrikeZone PPS	Helena

APPENDIX A

2007 ODOT/OSU HERBICIDE PROGRAM SURVEY

2007 ODOT/OSU Herbicide Program Survey (2 pages)

Please return to your Division Headquarters on or before Aug. 24, 2007. Then forward to Doug Montgomery ASAP.

ODOT Division: _____ County/Interstate Maintenance Facility: _____
Superintendent: _____

1. How many lane miles of state highway are in your maintenance area? _____
2. Was an application record filled out for each herbicide application? **yes_____ no _____**
3. How many personnel do you use when mixing and loading herbicides into spray trucks?

   always 1 _____ 1 or 2 _____

   always at least 2 _____ 3 or more _____
4. How many personnel do you use on a spray truck when applications are being made?

   always 1 _____ 1 or 2 _____

   always at least 2 _____ 3 or more _____
5. How often is the herbicide spray truck calibrated?

   once each year _____ once for each different herbicide treatment _____

   once a week _____ once a day _____ other: _____
6. Who decides on whether to spray on a day-to-day basis?

   division personnel _____ superintendent _____

   TMW I or II _____ other: _____
7. What was the brand name of your glyphosate product that you used this year ?

   Roundup Pro Concentrate ___ Generics (Mirage, Honcho, etc…) _____
8. Who decides on what herbicides and rates are applied at your maintenance facility?

   div. personnel _____ superintendent _____

   TMW I or II _____ other: _____
9. How many informal landowner complaints/concerns (phone calls, personal visits, etc…) did you have this year as a result of your herbicide program?

_____

10. How many, if any, formal complaints were filed against your herbicide program with the Okla. Dept. of Agriculture? If yes, please include a brief description of complaint(s).

_____

_____

11. If you applied the new herbicide Milestone VM this year please give a brief explanation of its performance and what weeds it did not control?

_____

_____

_____

_____

Summary of 2007 Herbicide Applications

(Please fill in the data for every block as precisely as possible, if you do not know then please estimate)

Herbicide Treatment	Herbicide product/Acre	Target Weed(s)	Date Started	Date Ended	Number of Loads	Acres/ Load	Total Acres	Overall Success Good	Fair	Poor
Example: Campaign + AMS	***2 pts. + 3.4 lbs.***	***brome, cheat, hairy vetch***	***3-15-02***	***4-7-02***	***15***	***43.3***	***649.5***	***xxx***		
Campaign + AMS (+/-Milestone)										
Rndp Pro Conc. + Oust										
Rndp Pro Conc. + Outrider										
Rndp Pro Conc. + Plateau										
MSMA + _____										
Rndp Pro Conc. (alone)										
Aquastar (Rodeo) + surfactant										
Arsenal + _____										
Vanquish + surfactant										
Transline + surfactant										
Distinct + surfactant										
Tordon K + Garlon 4										
Garlon 4 + oil carrier (basal)										

**** Please include any additional treatment comments on an attached page ****

Thank you for all of your roadside vegetation management efforts this year.