2006 Annual
Oklahoma Department of Transportation
Herbicide Program Report

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1.0 Introduction

The purpose of this annual report was to document the successes, failures and challenges of ODOT chemical weed control program in 2006. As each field division makes herbicide application decisions independent of other divisions, we attempted to minimize comparisons among divisions. However, it can be interesting and useful to examine trends in herbicide programs among/between divisions. We attempted to document the progress of each field division on its own merit, considering their different attitudes and unique management goals. When appropriate, recommendations and comments were made to assist divisions in solving issues that became apparent after reviewing this year's herbicide use 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, may have considerations unknown to Oklahoma State University Roadside Vegetation Management Program personnel. If there is disagreement by any division personnel as to our comments or recommendations, we ask that we have the opportunity to clarify recommendations.

The greatest challenge this year was the statewide drought that persisted from Sept. ’05 through Sept. ’06. Oklahoma is a state that is well aware of drought issues, but this past year the severity and duration was unprecedented. Many state records have been broken with respect to the drought of 2006. From this report/survey it has been documented that ODOT treatment acreages were down significantly from the past and that weed control results for many applications were poor. These results were a both a direct and indirect effect of the drought conditions. Results should be viewed as ODOT personnel trying to do their best in a very difficult season rather than there being a poor effort from ODOT personnel. ODOT should be able to continue its historically sound herbicide programs once more “normal” climatic conditions return. An attempt will be made in Section 10 of this report to explain the plant responses to drought conditions and the drought’s effect on herbicide efficacy. Such a discussion should help explain some of the decisions made this past year, weed control results and problems experienced by many.

In the body of this report most references to herbicides will be made by using their common name instead of their brand name. An example would be a reference to ‘glyphosate’, the active ingredient, instead of ‘Roundup Pro Concentrate®’, ‘Honcho Plus®’, or ‘Mirage®’, which are the brand or registered trade names. 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 brand names in parentheses.

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 would 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 that these reports can accurately reflect ODOT’s weed control efforts. 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 3, 2006 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 this year consisted of a glyphosate/2,4-D + AMS broadcast treatment. Acreages treated decreased significantly from the previous year because of the drought but treatments that were applied produced good results. Glyphosate/2,4-D + AMS application rates and timings were good. Division One split its roadsides this past summer and treated approximately half with glyphosate + sulfometuron and the other half with glyphosate + sulfosulfuron. This would be the first time in 3 years that many of Division One roadsides received a summer herbicide treatment. Treatment rates were overall good, a few rates were a little low, and timings were good. Division One summer treatments produced good results that were above average when compared to the results from other areas of the state. Division One did a little spot treating with MSMA with good results. Division One also used glyphosate (alone) to treat sign posts & guardrails with good results. Triclopyr ester was used as a cut-stump and foliar treatment to control brush with good to fair success.

2.2 Comments and Recommendations from OSU Personnel

From both the survey and division comments, it appears Division One had a successful 2006 roadside vegetation management program for both the spring and early summer months. Division One administration seems to be very interested in developing and maintaining a good roadside weed control program. Results from this year's glyphosate/2,4-D + AMS and glyphosate + sulfosulfuron or sulfometuron treatments were good during a year where many ODOT personnel struggled to get good results. Considering statewide weed control results were poor this year because of the drought, Division One personnel were able to achieve positive results. This should give Division One the confidence that keeping this years herbicide program going into 2007 should only reap greater results when drought conditions are not so intense. We recommend staying the course with a Feb./March application of glyphosate/2,4-D + AMS and May/June application of glyphosate + sulfosulfuron.

Division One also expressed an interest in brush control treatments that will not produce the "brownout" affect typical of some brush control herbicides. There are several brush control treatments and techniques that Division One can choose from to achieve brush control without creating brownout. The first is by applying fosamine + crop oil anytime during late summer through September. Susceptible brush leaves will absorb the fosamine but will not discolor. They will go through a normal leaf drop in the fall but species that are susceptible to fosamine will not leaf out the following spring. Another herbicide and technique is to apply triclopyr amine + crop oil in late winter/early spring at bud break. This application is made to the bare stems of targeted

brush and will control susceptible brush species before the brush puts on any leaves. Both of these treatments require good coverage of the target brush to achieve high levels of control. The final two treatment techniques use the same herbicide, triclopyr ester plus oil carrier, and are applied to either the cut surface after tree removal or applied to the bottom 12-18 inches of tree trunks. Division One has used both the cut-surface and basal bark treatments in the past with varying success. Both of these treatments are widely and successfully used and will not produce brownout. In conversations with power line vegetation management personnel, OSU has found there could be additional treatment combinations, such as triclopyr ester + imazapic that may provide better or more consistent results for Division One personnel. Darren Saliba also mentioned the importance of controlling brush that pops up around the bases of culverts and other concrete structures. In many cases these areas could hold water making them an aquatic site and not a terrestrial roadside. In these cases to protect ODOT from a claim of misuse it would be in ODOT's best interest to use an aquatic-approved herbicide to control aquatic species such as willow, cottonwood, or cattails. ODOT could use either glyphosate (aquatic) or imazapyr (aquatic). Division One personnel are encouraged to contact OSU personnel for specific treatment rate recommendations and other treatment or technique information.

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	2 pt + 4.25 lb (1) 2 pt + 3.9 lb (1) 2 pt + 2.4 lb (1)	various weeds winter annuals	2-5-06	3-14-06	520	1,561	good (2) fair (1)
glyphosate (Credit Extra, Honcho) + sulfosulfuron (Outrider)	2 pt + 1 oz (1) 0.75 pt + 1 oz (1) 1 pt + 1 oz (2) 10.5 oz + 0.65 oz (1)	weeds grass johnsongrass	5-31-06	8-5-06	457	2,287	good (3) fair (2)
glyphosate (Honcho, Honcho Plus) + sulfometuron (SFM75)	2 pt + 1 oz (2) 1 pt + 1 oz (3)	weeds johnsongrass broadleaf weeds	5-2-06	6-20-06	728	3,639	good (4) fair (1)
MSMA (Clean Crop)	2.5 gal/300 gal water (1) (handgun treatment)	johnsongrass broadleaf weeds	5-18-06	5-18-06	-----	-----	good (1)
glyphosate (Credit Extra, Honcho)	0.5% solution handgun (1) 2 qt handgun (1) 1.0% solution handgun (1) 3.1 oz (1) ??? (1)	johnsongrass broadleaf weeds signs guardrails brush weeds & grasses	5-1-06	7-12-06	101+	507+	good (5)
triclopyr (Garlon 4) + non-ionic surfactant	4 qt handgun (1) 1.5 qt + 0.25% solution handgun (1)	weeds brush woody plants	5-9-06	7-6-06	25	50	good (2)
triclopyr (Garlon 4) + oil carrier	handgun ??? (1)	cut stump treatment	-----	-----	-----	-----	fair (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.

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 no apparent concerns arose. A meeting was held at Division Two headquarters on October 4, 2006 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 did not apply any herbicide treatments for the control of winter annual weeds during 2006. The summer weed control program consisted of three main treatments. Glyphosate + sulfometuron, MSMA alone or mixed with imazapic/2,4-D. Each of these treatments was used to successfully control johnsongrass and other summer weeds. While some of the glyphosate + sulfometuron rates were outside of OSU recommendations other herbicide rates and application timings were good. Glyphosate was used to treat various weed problems as well as guardrails with success. Picloram + triclopyr ester foliar treatments were applied with success in controlling brush. Triclopyr amine was used by one maintenance unit to successfully control brush in early summer.

3.2 Comments and Recommendations from OSU Personnel

In the past, Division Two has relied a great deal on winter-applied atrazine to provide control of winter annual weeds while also providing preemergence control of later germinating summer broadleaf weeds. The use of atrazine is gone and it is very unlikely to return as a legally labeled product for roadsides. The main goal of atrazine was to provide control of winter annual weeds. This is currently achieved with a late February or early March treatment of glyphosate/2,4-D + AMS. However, this treatment will not supply the residual preemergence control of atrazine, but, has proven in other ODOT divisions to provide very good control of winter annual weeds. If Division Two does plan on transitioning to the glyphosate/2,4-D + AMS treatment, it will be important to let OSU personnel know so that the herbicide training program can be adjusted to supply their personnel with the necessary information for a quick and easy implementation. The biggest change will be instead of spraying in December, January and into February, applications would be made in late February through March. It is also critical to mix and dissolve the AMS into a full tank of water before adding the glphosate/2,4-D.

Division Two, along with Division Six, have expressed an interest in reviving the use of diuron. Diuron was used in the past by several divisions to provide preemergence control of kochia and other broadleaf and grassy weeds. In the past most Diuron labels required that a minimum of 5.0 lbs. product/Acre be used, but as developed in OSU research, it was found that 3.0 lbs. product/Acre would produce the desired selective weed control. In Oklahoma it is illegal to use an herbicide at a rate lower than stated on its label. For many years Dupont (the original manufacturer of diuron) maintained the necessary special state labeling that allowed the lower use rate. This necessary state labeling eventually expired and the manufacturer was no longer interested in supporting future low rate uses. ODOT diuron use slowed and finally there were several years where there was no diuron use at all. With the recent interest in future diuron use,

OSU has investigated current diuron labels and has found a currently labeled product that will allow ODOT to use it in accordance with OSU recommendations without having additional state labeling. The product, Diuron 80 WDG manufacturer by Loveland Industries, will allow ODOT to use the 3.0 lbs. product/Acre on roadsides. This is the only product currently on the market that will allow the legal use of diuron, if OSU recommendations are to be followed. This specific product is currently being supplied by UAP Distributors (Tollie Green). More information can be found on this product in Section 10 of this report.

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 + sulfometuron or MSMA treatments. While glyphosate + sulfometuron may be the best overall summer treatment on the market, there is some interest in looking into switching from sulfometuron to sulfosulfuron mixed with the glyphosate. This is also a recommended treatment and would provide a little better control of johnsongrass while producing a little less control of some of the summer broadleaf weeds. The sulfosulfuron treatment would also cause less yellowing of roadside bermudagrass. Both treatments are very good so this is a win-win decision.

At the October Division Two meeting division personnel requested that triclopyr amine, triclopyr ester, picloram, and fosamine be placed back on the annual statewide contract. Division Two personnel are planning to use more of these brush herbicides in the future and will require larger purchases that will be difficult with p-cards. OSU personnel agreed to work with Alex Calvillo and request that these herbicides be placed back on the contract for the next contract (February 2007).

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 (Roundup Pro Conc.) + sulfometuron (Oust)	2 pts + 0.5 oz (1) 1 pt + 0.96 oz (3) 1.2 pt + 0.64 oz (1)	johnsongrass ryegrass annual and perennials weeds	4-14-06	6-23-06	580+	2,901+	good (4) ??? (1)
MSMA (many)	0.5 gal (2) 0.55 gal (1)	johnsongrass	8-3-05	9-1-05	317	950	good (3)
MSMA (many) imazapic/2,4-D (Oasis)	3 pt + 6 oz (1)	johnsongrass broadleaves	5-11-06	6-30-06	1,199	1,199	good (1)
glyphosate (Roundup Pro Conc.) + dicamba/diflufenzopyr (Overdrive)	1 pt + 1 oz (1)	annual weeds perennial weeds	5-15-06	5-22-06	528	528	good (1)
glyphosate (Credit) + dicamba/diflufenzopyr (Overdrive)	0.83 gal + 6 oz (1)	johnsongrass annual grasses thistle	5-1-06	5-16-06		3	good (1)
glyphosate (Roundup Pro Conc., Credit)	1 pt (1) 1.6 pt (1)	annuals perennials thistles broadleaf weeds	4-17-06	6-8-06	329	658	good (2)
glyphosate (Roundup Pro Conc.) + sulfometuron (Oust)	??? (1)	guardrail grass control	5-30-06	7-3-06	45	45	good (1)
picloram (Tordon K) + triclopyr (Garlon 4)	??? (1)	brush	6-26-06	6-26-06	60	60	good (1)
triclopyr (Garlon 4)	0.5 gal (1)	broadleaf weeds	9-19-05	6-5-06	138	138	fair (1)
triclopyr (Garlon 3A)	2.2 qts. (1)	woody plants	5-19-06	5-19-06	20	20	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 11 out of 12 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 October 4, 2006 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) followed by glyphosate + sulfosulfuron (May/June) treatments but because of the drought the acreage treated was down significantly. Glyphosate/2,4-D + AMS treatments provided fair weed control as both rate and timing criteria were met. Approximately one half of Division Three received the summer glyphosate + sulfosulfuron treatment and those that did treat received fair to good results. Again, these less than desirable results were a result of the extreme drought conditions experienced in south central Oklahoma. Glyphosate was also successfully used as a handgun treatment for total vegetation control.

4.2 Comments and Recommendations from OSU Personnel

Division Three has had a very good consistent herbicide program for several years and then along came the drought of 2006. Hopefully 2006 will go down in the record books as a dry year and we can all return to more normal rainfall in 2007. Division Three personnel have stated they will return to the herbicide program efforts of 2005 which should once again provide a good broad spectrum weed control program for their roadside clear zones. Like other divisions, some roadsides in Division Three are showing an increase in summer broadleaf weed populations. In 2007 ODOT will have a new herbicide recommendation from OSU for the use of aminopyralid (Milestone VM). Aminopyralid should provide good preemergence or postemergence control of many common summer and winter annual broadleaf weeds. Where Division Three supervisors are experiencing summer annual broadleaf weed problems they could likely benefit greatly by adding aminopyralid, at a rate of 4 oz. product/Acre, to their glyphosate/2,4-D + AMS treatment in March. The one weak spot that we know of with aminopyralid is that it will not control kochia or field bindweed. It has shown to provide good control of ragweed, marestail, coreopsis, and pigweed when applied in March as a preemergence application. Aminopyralid can also be applied in May/June for postemergence control of summer broadleaf weeds. However, in OSU trials it has not performed as well as diglycolamine salt of dicamba at 16 oz. product/Acre. The diglycolamine salt of dicamba treatment will also control kochia and must be used with caution around sensitive broadleaf crops, vineyards, and gardens.

At the October Division Three herbicide meeting, managing roadsides that are adjacent to vineyards was discussed in detail. This is an issue that all ODOT field divisions have to deal with more and more as the number of vineyards continue to increase. Vineyard owners are highly motivated farmers growing a very sensitive crop and ODOT will need to give them a wide buffer zone. In most circumstance leaving a one mile buffer zone should be more than adequate to

protect the vineyard. In these situations the roadside will likely need ropewick herbicide applications or increased mowing to meet ODOT roadside vegetation management goals. ODOT supervisors will need to do everything they can to keep up with where new vineyards pop up within their maintenance areas. On the Oklahoma Dept. of Agriculture, Food, and Forestry web site they are maintaining a sensitive crop registry that maps the locations of cotton, vineyards, and organic crops. This tool is easy to use and can be very helpful as more and more sensitive crop growers are registering their crop. Training has been provided to all ODOT personnel on managing roadsides around sensitive crops & the ODAFF sensitive crop web site, at this point it will take a concerted effort on the part of ODOT personnel to keep up with this changing farming segment.

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 + 3.4 lb (1)	winter annuals broadleaf weeds	3-12-06	3-28-06	660	660	fair (1)
glyphosate/2,4-D (Campaign)	1 oz/gal (spot treatment)	winter annuals sign post guardrail	4-12-06	4-18-06	-----	-----	good (1)
glyphosate (Honcho, Honcho Plus, Mirage) + sulfosulfuron (Outrider)	1 pt + 1 oz (5) 1 pt + 0.5 oz (1)	johnsongrass broadleaf weeds	5-16-06	8-18-06	452	2,713	good (2) fair (4)
glyphosate (Honcho, Mirage) +/- AMS	5% solution (1) 2% + 10.2 lb (1) 1.5% solution (1) ??? (1)	encroachment total vegetation control guardrails	5-11-06	8-1-06	15+	60+	good (2) ??? (2)
glyphosate (Mirage) + sulfosulfuron (Outrider)	1 pt + 1.25oz (1)	guardrails	6-1-06	6-30-06	41	41	good (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 no apparent concerns arose. On September 8, 2006 a Division Four Herbicide Program meeting was held at the division headquarters. The meeting was attended by county superintendents, field clerks and field division administrative personnel. The comments and recommendations in this report are based on the surveys and meeting.

Division Four herbicide usage is summarized in Table 4. Glyphosate/2,4-D + AMS were used successfully to control winter annual weeds but because of the drought, the acreage treated was down significantly. Glyphosate/2,4-D + AMS rates and timings were good. This year Division Four used a summer broadcast treatment of glyphosate + sulfometuron for most of the division. Treatment rates and timings overall were good to achieve the maximum weed control from the glyphosate + sulfometuron treatments. Division Four personnel used dicamba/diflufenzopyr, clopyralid, and triclopyr ester to spot & broadcast treat musk thistle with success. Some of the treatment rates for these products were a little high and in the survey it was unclear if a non-ionic surfactant was used. It is important to use a non-ionic surfactant since these herbicides are absorbed primarily through the foliage of the musk thistle and the surfactant will increase absorption. Bromacil and bromacil/diuron treatments continue to be used by Division Four crews successfully as a shoulder and guardrail encroachment treatment. Division Four, Terry Shrum/Noble County was the first, within ODOT, to use the new aquatic herbicide imazapyr (aquatic) to successfully control cattails and willows.

5.2 Comments and Recommendations from OSU Personnel

In 2006 Division Four was going to address the growing problem of the winter annual weed annual ryegrass. Intentions were to target annual ryegrass but because of the severe drought during March this treatment was postponed. We recommend that Division Four, because of the continued severity of annual ryegrass problems, look at an alternative treatment to their otherwise very successful glyphosate/2,4-D + AMS. In those counties that have annual ryegrass problems we recommend switching to a glyphosate only treatment. The rate of application would be 1 quart/Acre of glyphosate + AMS (or 26 fluid ounces per acre of Roundup Pro Concentrate). The treatment costs compared to the traditional glyphosate/2,4-D + AMS will actually be slightly less. The most important thing to consider about this switch is the new treatment must be completed by the end of March in the northern half of the division and by the third week of March in the southern half of this division. Do not use this higher rate of glyphosate during the month of April as it could cause unacceptable damage to common bermudagrass that will be greening up. This treatment should provide very good control of annual ryegrass and most other cool-season annual weeds. It will also suppress musk thistle to the point where it will struggle to produce flowers. We would also recommend that Division Four, because of the increase in summer broadleaf weed problems in the western part of this division, look very seriously at including aminopyralid (Milestone VM) at a rate of 4 oz. product/Acre in the glyphosate/2,4-D + AMS or glyphosate (alone) + AMS treatment. Aminopyralid would help provide long-term residual control of the many summer annual broadleaf weeds. Many of the species of annual

broadleaf weeds that Division Four is having problems with would be controlled with the aminopyralid and applying it with the glyphosate (alone) + AMS treatment would not create much of an additional treatment effort. The addition of aminopyralid would increase treatment costs by approximately $9.00/Acre. Division Four needs to be aware that aminopyralid will not control kochia or field bindweed. Traditional May/June herbicide treatments of diglycolamine salt of dicamba will still be needed on areas where kochia or field bindweed is a target. We would like to encourage Division Four to continue with their summer glyphosate + sulfometuron or sulfosulfuron program keeping in mind the optimum time to apply the treatments. We encourage the continued use of bromacil and bromacil/diuron herbicides as bareground total vegetation control treatments, but Division Four crews need to remember to accurately apply this product and be very cautious when applying near sloped areas and trees. Bromacil is very mobile in runoff water and can damage sloped areas for several months as well as severely damaging trees. Simply be aware of what is adjacent to the areas you are treating with these treatments and watch where runoff water flows. We appreciate the effort that Division Four had this year in controlling the state noxious weed, musk thistle. Division Four is the leader among ODOT field divisions in acres treated for musk thistle control followed closely by Division Eight personnel. We encourage Division Four personnel to call OSU personnel for assistance with treatment rates or tank recipes when they are developing spot treatments for musk thistle or any other weeds.

Table 4. 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/2,4-D (Campaign) + AMS	2 pt + ??? (1)	broadleaf weeds	3-2-06	4-14-06	688	688	good (1)
glyphosate (Roundup Pro Conc.) + sulfometuron (Oust XP)	1 pt + 1 oz (5) 22.2 oz + 1.1 oz (1) 18 oz + 1 oz (1) 12 oz + 0.75 oz (1) 19.7 oz + 1.5 oz (1)	johnsongrass annual broadleaf weeds & grasses hairy vetch sweet clover	5-15-06	6-28-06	664	5,977	good (6) fair (2) ??? (1)
dicamba/diflufenzopyr (Overdrive) + surfactant	4.0 (1)	musk thistle (spot treatment)	3-1-06	5-1-06	3.5	3.5	good (1)
clopyralid (Transline) + surfactant	10 oz (1) 50 oz (?) 3 oz (1)	musk thistle (spot/broadcast)	4-26-06	6-9-06	53	158	good (3)
triclopyr (Garlon 4) + oil carrier	48 oz (10	thistles (spot treatment)	5-2-06	5-2-06	0.75	0.75	good (1)
bromacil/diuron (Krovar IDF)	4.5 lb (2) 9.0 lb (2)	total vegetation control guardrails seams	4-27-06	7-19-06	9.5	38	good (3) fair (1)
bromacil (Hyvar XL)	1 gal (1)	total vegetation control	4-21-06	6-2-06	22.5	22.5	good (1)
imazapyr (Habitat)	1 gal (1)	cattails willows	5-23-06	5-24-06	7.5	7.5	fair (1)
glyphosate (Roundup Pro) + sulfometuron (Oust)	2.0 qt + 4 oz (1)	annual broadleaf weeds & grasses	5-17-06	5-18-06	1.0	1.0	fair (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 12, 2006 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. Division Five postponed the normal glyphosate/2,4-D + AMS treatment, which is applied in February and March for winter annual weed control, because of the severe drought at that time. Division Five summer herbicide programs consisted mainly of glyphosate + sulfometuron treatments with the remainder being treated with combinations of MSMA, diglycolamine salt of dicamba, sulfometuron, or imazapic combinations. This adds up to 5 distinctly different treatments that are designed to control summer broadleaf and grassy weeds. Overall these treatments provided fair to poor control of johnsongrass and other troublesome weeds even though treatment rates and timings were good. The only summer treatments that provided consistently good control were those that included MSMA alone or mixed with sulfometuron. Most of the treatments that included glyphosate mixed with sulfometuron or imazapic provided very erratic and poor results that were likely due the severe drought conditions. In Section 10 of this report an attempt will be made to explain why 2006 herbicide applications were affected by the drought. The following is a list of some of the comments that were attached to Division Five surveys:

Division Five Maintenance Yard	Comment about the summer herbicide treatment glyphosate + sulfometuron
Dewey County	Herbicide treatments did not control weeds well, inconsistent, mainly because of drought
Custer County	Lack of glyphosate/2,4-D + AMS program and drought made summer program inconsistent
Harmon County	Glyphosate + sulfometuron program had little affect on weeds, MSMA killed weeds in two days
Washita County	Lack of glyphosate/2,4-D + AMS program and drought made summer program inconsistent
Jackson County	Drought caused inconsistent results as compared to the past.

Bareground guardrail and shoulder treatments used included various combinations of glyphosate, imazapyr, and sulfometuron. Fair control was achieved from each of these treatments. Control from these treatments was not quite as good as in the past which is likely result of the drought. The treatment of glyphosate + imazapyr + sulfometuron was applied this year using the Patchen roadside shoulder sprayer with fair results. Glyphosate (aquatic) was used to control cattails and vegetation around guardrails with good to fair success.

6.2 Comments and Recommendations from OSU Personnel

We would like to encourage Division Five personnel to continue with their basic winter annual weed control program of glyphosate/2,4-D + AMS followed by the various summer herbicide treatments used. Continuing to use the proper rates and timings will achieve the best control possible with the selected treatments. It is important that Division Five personnel understand that the less than desirable results experienced this year, from many of the herbicide treatments, was a result of the severe drought. In the future, when normal rainfall returns, Division Five should once again experience the beneficial weed control that has been achieved with past herbicide applications of February or March applications of glyphosate/2,4-D + AMS and May or June applications of glyphosate + sulfometuron or sulfosulfuron.

At the September Division Five meeting division personnel requested that glyphosate (aquatic) be placed back on the annual statewide contract. OSU personnel agreed to work with Alex Calvillo and request this product be placed back on the contract for the next contract (February 2007).

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 (Honcho, Honcho Plus) + sulfometuron (SFM75, Oust XP)	16 oz + 1 oz (2) 14 oz + 0.69 oz (1) 10 oz + 0.5 oz (2) 12 oz + 0.5 oz (1) 16 oz + 0.5 oz (4) 32 oz + 1.0 oz (1)	johnsongrass broadleaf weeds annuals	5-8-06	6-28-06	653	7,180	good (1) fair (2) poor (8)
glyphosate (Honcho) + sulfometuron (Oust, SFM75) + dicamba (Vanquish)	1 pt + 0.5 oz + 1.5 pt (1)	johnsongrass broadleaf weeds bindweed	5-30-06	6-13-06	520	520	fair (1)
glyphosate (Roundup Pro Conc) + imazapic (Plateau)	??? + 4.0 oz (1)	bermudagrass release	5-16-06	5-18-06	80	80	poor (1)
glyphosate (Roundup Pro Conc)	2 qt (1)	bermudagrass release	5-17-06	5-26-06	160	160	poor (1)
MSMA (Weed hoe)	1.5 qt (1) 2.0 qt (5) 2.1 qt (1)	johnsongrass annuals broadleaf weeds pigweed crabgrass	5-11-06	6-26-06	276	1,930	good (5) fair (2)
MSMA (Weed hoe) + sulfometuron (Oust)	2 pts + 0.5 oz (1)	johnsongrass	5-22-06	5-22-06	80	80	good (1)
pendimethalin (Pendulum 3.3) + glyphosate (Roundup Pro Conc.)	2 qt + 2 pt (1)	sandburs all weeds	3-31-06	3-31-06	2.5	2.5	fair (1)
dicamba (Vanquish) + dicamba/diflufenzopyr (Overdrive)	1 pt + 4 oz (1)	musk thistle (spot treatment)	6-6-06	6-6-06	???	???	good (1)
glyphosate (Roundup Pro Conc., Honcho, Honcho Plus)	52 oz (1) 69 oz (1) 3% solution (1) variable (1) ??? (1)	total vegetation control johnsongrass broadleaf weeds tree stumps/ switchgrass	1-4-06 (cut stump) 5-13-06	8-11-06	38	191	good (1) fair (3) ??? (1)
glyphosate (Roundup Pro Conc.) + sulfometuron (Oust)	2 qt + 3 oz (1)	total vegetation control (Patchen Sprayer)	7-17-06	7-19-06	???	???	good (1)
glyphosate (Honcho, Roundup Pro) + imazapyr (Arsenal)	variable (1) 1% solution + 0.5% solution (1) 3% solution + 2.0% solution (1) 52 oz + 32 oz (1)	total vegetation control	5-16-06	7-25-06	24	97	good (2) fair (2)
glyphosate (Roundup Pro Conc.) + imazapyr (Arsenal) + sulfometuron (SFM75, Oust)	2.5% solution + 1% solution + 2 oz (2) variable (1)	total vegetation control guardrail (Patchen Sprayer)	5-18-06	7-7-6	4+	8+	good (1) fair (2)
imazapyr (Arsenal) + sulfometuron (Oust)	1% solution + 0.5 oz (1)	total vegetation control	7-27-06	7-27-06	10	10	fair (1)
glyphosate (Aquamaster, Aqua Star) + surfactant	1 gal + 1 gal (2)	cattails	5-1-06	6-30-06	14	27	good (1) 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 12, 2006 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. In the past Division Six relied on atrazine to control winter annual weeds. With the loss of atrazine Division Six had planned to transition into a glyphosate/2,4-D + AMS treatment in March to achieve the same goal. However, Division Six did not apply the glyphosate/2,4-D + AMS treatment this year as planned primarily due to drought conditions. Most of Division Six roadsides received a summer weed control treatment of glyphosate + sulfometuron to control johnsongrass and various other weeds. The rate of application of these treatments was good but, as in the past, there was a wide range of treatment timings. Applications within Division Six began as early as May 12 (a little early) and ended on July 21 (late). Considering the location of Division Six, a good time frame to shoot for with a summer glyphosate + sulfometuron weed control program would be from mid to late May as a starting point and ending up in late June. If it was necessary to apply summer applications in July, sulfometuron should be replaced with sulfosulfuron to minimize injury to common bermudagrass and buffalograss. Weed control achieved from these treatments was fair to good which is overall poorer results than past years. The poorer results were likely due to the drought conditions. Dicamba alone or mixed with glyphosate was used to successfully control musk thistle in early summer. Also, glyphosate combined with imazapyr or sulfometuron was applied to produce total vegetation control on roadside shoulders with fair to good success. Division Six again expressed interest in getting the Patchen sprayer replaced so they can return to the former level of shoulder treatments thus reducing encroachment damage from vegetation.

7.2 Comments and Recommendations from OSU Personnel

OSU personnel would like to reassure Division Six personnel concerning the benefits of the winter annual weed control treatment of glyphosate/2,4-D + AMS. We would recommend that Division Six consider including this treatment in their 2007 weed control efforts. We would also recommend that Division Six, because of the increase in summer broadleaf weed problems, look very seriously at including aminopyralid (Milestone VM) at a rate of 4 oz. product/Acre in the glyphosate/2,4-D + AMS treatment. Aminopyralid would help provide long-term residual control of the many summer annual broadleaf weeds. Many of the species of annual broadleaf weeds that Division Six is having problems with would be controlled with the aminopyralid and applying it with the glyphosate/2,4-D + AMS treatment would not create much of an additional treatment effort. The addition of aminopyralid would increase treatment costs by approximately $9.00/Acre. Division Six needs to be aware that aminopyralid will not control kochia or field bindweed. Traditional May/June herbicide treatments of diglycolamine salt of dicamba will still be needed on areas where kochia or field bindweed are being targeted. Division Six, along with Division Two, have expressed an interest in reviving the herbicide diuron. Diuron was used in

the past by several divisions to provide preemergence control of kochia and other broadleaf and grassy weeds. In the past, most diuron labels required that a minimum of 5.0 lbs. product/Acre be used, but as developed in OSU research it was found that 3.0 lbs. product/Acre would produce the desired selective weed control. In Oklahoma it is illegal to use an herbicide at a rate lower than stated on its label. For many years Dupont (the original manufacturer of diuron) maintained the necessary special state labeling that allowed the lower use rate. This necessary state labeling eventually expired and the manufacturer was no longer interested in supporting future low rate uses. ODOT diuron use slowed and finally there were several years where there was no diuron use at all. With the recent interest in future diuron use OSU, has investigated current diuron labels and has found a currently labeled product that will allow ODOT to use it in accordance with OSU recommendations without having additional state labeling. The product, Diuron 80 WDG manufacturer by Loveland Industries, will allow ODOT to use the 3.0 lbs. product/Acre on roadsides. This is the only product currently on the market that will allow the legal use of diuron if OSU recommendations are to be followed. This specific product is currently being supplied by UAP Distributors (Tollie Green). More information can be found on this product in Section 10 of this report.

We would like to encourage Division Six to continue with this years summer treatment of glyphosate + sulfometuron. Division Six has expressed interest next year in possibly spot treating with MSMA in lieu of a division wide treatment of glyphosate + sulfometuron. While spot treating can be effective, many times it is a result of insufficient funds to pay for a broadcast treatment. Indications are, due the state centennial next year, ODOT may have additional funding available for field divisions to fund both a division wide winter annual weed control treatment and a division wide summer johnsongrass control treatment. Funding may also be available to help offset the cost of including aminopyralid into the winter annual weed control treatment. We encourage all field divisions to look into the additional funding through the state maintenance office.

At the request of Division Six personnel, OSU has contacted the manufacturer of the Patchen shoulder sprayer to get current information on replacing the Patchen sprayer that was destroyed a few years ago. OSU personnel secured the information and forwarded it to Division Six personnel for their consideration. There were two different strategies that Division Six could have pursued. One was to build the new sprayer in-house after purchasing most of the parts directly from the manufacturer or contract with Wylie Sprayer to build the sprayer for them. OSU personnel can assist Division Six personnel which ever direction they decide to pursue. The manufacturer said for them to build a single unit and supply it directly to Division Six would be very expensive. The manufacturer suggested the two current alternatives.

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 (Ranger, Roundup Pro Conc., Honcho, Roundup Pro) + sulfometuron (SFM75, Oust)	1 pt + 1 oz (8) ??? (1)	broadleaf weeds johnsongrass Kochia annuals	5-12-06	7-21-06	673	6,054+	good (3) fair (6)
dicamba (Banvel)	1.0 qt (1) ??? (1)	musk thistle broadleaf weeds	4-13-06	5-9-06	1.5+	3+	fair (1) ??? (1)
dicamba (Banvel) + glyphosate (Roundup Pro Conc.)	??? (1)	musk thistle	5-1-06	6-1-06	1	1	good (1)
glyphosate (Honcho) + sulfometuron (Oust)	2.5 pt + 2 oz (1)	shoulder all weeds	6-21-06	7-18-06	87	87	fair (1)
imazapyr (Arsenal) + glyphosate (Roundup)	1% solution + 2% solution	crack in road total vegetation control	6-22-06	8-5-06	???	???	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 11, 2006 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. Division Seven has applied atrazine for winter annual weed control for many years and 2006 was going to be the year they transitioned into a division-wide glyphosate/2,4-D + AMS treatment. A few of Division Seven roadsides were treated this past winter with glyphosate/2,4-D + AMS but, as with other divisions, the severe drought limited the acreage treated. The glyphosate/2,4-D + AMS treatments that were applied provided good weed control. Treatment rates were good but several of the applications were made in mid to late April which is probably about 2-3 weeks late for this part of the state. Division Seven used MSMA (alone) to control johnsongrass and summer annual weeds with good success this past summer, however applications were made to significantly less acreage. Dicamba/diflufenzopyr and clopyralid herbicides were used to control musk thistle successfully this past year. Glyphosate (aquatic) was used with fair success to control cattails. Triclopyr amine + surfactant were used at a rate of a 1.5% solution to provide fair control of willows. Glyphosate + sulfometuron, imazapyr + sulfometuron, and glyphosate + imazapyr were all used on shoulders and guardrails to control all vegetation successfully.

8.2 Comments and Recommendations from OSU Personnel

Prior to the 2006 growing season Division Seven had a good game plan with respect to this years herbicide program. The decision was to use a division-wide treatment of glyphosate/2,4-D + AMS in late Feb./March and follow up with MSMA treatments in early summer. This was a good plan that would have likely produced good weed control and nice looking roadsides. What changed the program was the fact it was impossible to predict the severity and duration of the 2006 drought that affected both the planning and implementation of the herbicide treatments.

We recommend that Division Seven continue in 2007 with an effort to treat division-wide with glyphosate/2,4-D at 2 pts. /Acre + AMS at 17 lbs. /100 gallons of water in late winter. As far as optimum treatment timings in an average year the southern counties in Division Seven should be ready for Campaign + AMS applications as early as the last week in February. This may sound early to some folks but as long as the air temperatures are getting into the 50 degree range, the winter annual weeds will be susceptible and equipment should function just fine. Division Seven counties in the northern part of the division would normally start their Campaign applications a week or so later than those along the Red River. These timings should give Div. 7 about 4 weeks to apply all Campaign + AMS treatments and achieve the best weed control possible while minimizing injury to bermudagrass that has greened up early. Remember that applying Campaign under these cooler air temperatures will require 3 to 4 weeks to actually see a

lot of yellowing or control of target weeds. We would also like to encourage Division Seven to continue with their summer MSMA program to control johnsongrass and consider the following conditions. Under average conditions MSMA applications could be made as early as the last week of April in the southern part of the division and one to two weeks later in the northern part of Division Seven. Remember, if MSMA is sprayed by itself, it will take at least 2 applications about 3- 4 weeks apart to actually control perennial johnsongrass. The addition of sulfosulfuron to the first application should eliminate the need for follow-up MSMA applications. Division Seven should also remember that the cost of MSMA programs is increasing slightly each year and the good and safe glyphosate + sulfosulfuron program is very cost competitive.

We would also like to encourage Division Seven personnel to follow OSU herbicide recommendations as closely as possible to assure good consistent weed control. Remember the timing of a herbicide application is nearly as important as how much herbicide is applied. All OSU treatment recommendations are based on applying the herbicide(s) to a specific stage of weed growth to provide the maximum level of weed control at recommended rates.

Table 7. 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) + AMS	2 pt + 17 lb/100 gal (1) 1.6 pt + 5.2 lb (1)	broadleaf weeds johnsongrass	3-2-06	4-29-06	267	534	good (2)
MSMA (Weed Hoe 108)	2 qt (5) 2 pt (1) 2 gal (1)	johnsongrass broadleaf weeds musk thistle	4-26-06	7-20-06	498	3,498	good (6) fair (1)
glyphosate (Rodeo, Aqua Star) + non-ionic surfactant aquatic application	1% solution (1) 1.5% solution + 0.5% solution (1)	willows cattail	4-27-06	6-28-06	16	31	good (1) fair (1)
clopyralid (Transline) + non-ionic surfactant	2.5 oz + 0.75 oz/25 gal (1) 8 oz (1) 5 gal/600 gal (1)	musk thistle	3-12-06	5-2-06	19	57	good (2) fair (1)
dicamba/diflufenzopyr (Overdrive) + non-ionic surfactant	2 oz (1)	musk thistle others	5-9-06	5-12-06	0.5	0.5	good (1)
glyphosate (Honcho) + sulfometuron (Oust)	2 gal + 4 oz (1)	total vegetation control	5-15-06	5-25-06	30	30	good (1)
glyphosate (Honcho, Roundup Pro Conc.) + imazapyr (Arsenal)	3.2 qt + 0.53 qt (1) 2 qt + 5 gal/100 gal (1)	bermudagrass encroachment	5-11-06	6-28-06	16	32	good (2)
imazapyr (Arsenal) + sulfometuron (Oust)	34 oz + 1.4 oz/50 gal (1)	weeds grass total vegetation control	6-1-06	7-28-06	-----	-----	fair (1)
triclopyr (Garlon 4) + adjuvant (Adherent)	2 gal (2) 5% solution (diesel carrier)	trees & brush cut stump	9-30-05	6-6-06	-----	3.5+	good (1) fair (2)
triclopyr (Garlon 3A) + adjuvant (Adherent, non-ionic surfactant)	1.5% solution + 0.13% solution (1)	willow trees (aquatic) trees & brush	9-28-05	5-26-06	1	2	fair (2)
triclopyr (Garlon 3A)	1 gal (1)	trees	8-16-05	8-19-05	1.5	1.5	fair (1)
glyphosate (Roundup Pro Conc.)	1.5 pt (1)	guardrail total vegetation control	4-18-06	6-23-06	36	36	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 no concerns arose. A meeting was held at Division Eight headquarters on October 3, 2006 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 (alone) + AMS were used. While both treatments provided good control it appears from the surveys the glyphosate/2,4-D treatment provided more consistent winter annual weed control. Glyphosate/2,4-D + AMS rates and treatment timings were good. The glyphosate (alone) + AMS treatments were applied at the correct rates; however, the timing of many of the applications was very late. Both Pawnee and Mayes counties were applying this treatment in late April through early May and there is no doubt these applications damaged the common bermudagrass that would be initiating spring growth. OSU personnel witnessed this damage in Mayes County in mid May west of Pryor. Many of these applications were likely made 3 to 4 weeks after common bermudagrass starting greening up when it is very sensitive to any glyphosate treatment. Winter annual weed control treatments should be stopped once common bermudagrass exhibits 10-15% greenup which should occur around April 10-15 in an average year in Division Eight. Division Eight used a glyphosate + sulfometuron or sulfosulfuron summer herbicide treatment with good success this year. Herbicide rates were good for most of the counties but, application timing was late for many of the glyphosate + sulfometuron treatments. Glyphosate + sulfosulfuron treatment timings were good. Considering the location of Division Eight, the summer weed control program should be started in mid to late May with final treatments being made in late June assuming there are no drought conditions. If sulfosulfuron is used instead of sulfometuron, treatments can be made safely into July whereas sulfometuron applications need to be finished by the end of June. The reasoning for this has to do with how damaging these treatments will be on our desirable common bermudagrass. Clopyralid was used successfully to control musk thistle. Triclopyr ester + picloram were used to provide good brush control when applied as a foliar treatment in late summer. Triclopyr ester + oil carrier (4:1 ratio) was used as a cut stump treatment to control brush in mid winter with good success.

9.2 Comments and Recommendations from OSU Personnel

In 2006 Division Eight was the only field division that was able to sustain both a winter annual weed control program as well as a summer weed control program. Because of the severe drought statewide this year many divisions struggled with decisions that come hand in hand with a drought. Congratulations to Division Eight for not only their ability to sustain their basic herbicide program but, achieving above average results. This past year Division Eight had a very sound herbicide program with either glyphosate (alone) + AMS or glyphosate/2,4-D + AMS applied in late winter followed by glyphosate + sulfometuron or sulfosulfuron applied in early summer. We would like to encourage Division Eight to continue their 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. For the past two years several applications are being made outside of recommended timings. OSU publication E-958 has the optimum dates published for reference but, like any reference material, these application dates need to fit within the activities and priorities within each Field Division and maintenance facility. During these dates the targeted weeds should be at a susceptible stage of growth to obtain the highest level of weed control. It is a statewide goal of all ODOT herbicide programs to try and use the lowest herbicide rates possible to achieve acceptable levels of weed control. To be able to successfully use lower rates the timing of the application becomes very critical. After reviewing Division Eight herbicide equipment during June 13-15, 2006 there appeared to be several small problems with equipment that has a tendency of delaying herbicide applications. Hopefully after the equipment training effort, next year Division Eight personnel will feel a little more confident with their spray rigs. OSU personnel are working with personnel at the division headquarters and are in the process of addressing the Calc-An-Acre digital speedometer issue. The goal is to have a new Calc-An-Acre installed and working properly on each division eight spray truck before next spray season (March 2007). Division Eight spray rigs overall were in good shape, they just need to receive a little more annual maintenance and upkeep. OSU personnel will be back in the future to do more calibration training with division eight personnel, however until that time division eight personnel should call OSU when there are any questions about how equipment or nozzles are functioning and questions about calibrations concerns.

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) + AMS	2 pt + 5 lb (2) 2 pt + 3.4 lb (2) 2 pt + 6.7 lb (1)	broadleaf weeds fescue johnsongrass ragweed winter annuals	3-14-06	4-8-06	277	1,383	good (5)
glyphosate (Honcho, Honcho Plus) + AMS	25 oz + ??? (2) 24 oz + 3.4 lb (5) 24 oz + 5.0 lb (1)	winter annuals johnsongrass	3-6-06	5-1-06	597	4,775	good (5) fair (3) poor (1)
glyphosate (Roundup Pro, Roundup Pro Conc.) + sulfometuron (Oust, SFM75)	17.7 oz + 1.3 oz (1) 13 oz + 1.0 oz (1) 16 oz + 0.75 oz (1) 2 qt + 0.5 oz (1)	bermudagrass release johnsongrass broadleaf weeds guardrail	6-12-06	8-3-06	425	1,700	good (3) fair (1)
glyphosate (Roundup Pro Conc.) + sulfosulfuron (Outrider)	16 oz + 1 oz (5)	johnsongrass broadleaf weeds silver bluestem	5-12-06	7-6-06	655	3,275	good (4) fair (1)
glyphosate (Roundup Pro Conc., Honcho Plus)	2% solution (2) ??? (1)	guardrail sign post total vegetation control	5-1-06	8-1-06	69	208	good (3)
clopyralid (Transline)	0.33 oz/3 gal (1) ??? (1)	musk thistle	2-14-06	4-21-06	75	150	good (2)
triclopyr (Garlon 4) + oil	2 qt/2.5 gal diesel (1) ??? (1)	stump treatment brush	12-30-05	2-6-06	1+	2+	good (2)
picloram (Tordon K) + triclopyr (Garlon 4)	8 oz + 64 oz (1)	brush	8-8-06	8-25-06	40	40	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

Table 9 summarizes all herbicide treatments, their target weeds and the total acres treated by ODOT in 2006. There is no doubt that 2006 will go down as a difficult year to produce, administrate, and implement ODOT herbicide programs across the state. The difficulties are documented in the text and various tables of this report, but are most evident in examination of Table 10. Table 10 compares the state-wide acreages treated with six key herbicide treatments over the last four years. In the recent past there have been a few herbicide treatments, within various field divisions, that were cancelled because of lack of funding. This year was different in that 6 of 8 field divisions had significant reductions in the acreage treated because of one of the most severe droughts (Sept. 05 to Sept. 06) on record. Many of the treatments that were applied by ODOT this year did not provide acceptable weed control even though they were applied in the same fashion as in the past. Oklahoman's are accustomed to managing both plants and animals under drought conditions, but this year the burden was shared by the entire state for a very long period. As of November 2006 a large portion of the state is still under severe drought conditions. What all this has to do with ODOT programs lies in the fact that 90% of ODOT herbicide treatments consist of translocated herbicides. Translocated herbicides require an actively growing weed before they can effectively be absorbed and translocated (moved) to all parts of the weed. Conditions such as this year's drought prevent both the uptake and translocation of herbicides to critical sites within the target weeds, thus producing erratic or poor weed control. This is one of the reasons that OSU personnel continue to stress that the timing of applications is almost as critical as the herbicide rate itself. During recommended timings there is a higher probability of having more ideal weed growth and climate conditions to allow ODOT herbicides to produce optimum weed control. In 2006 drought conditions were so widespread and severe that it was very difficult to find any growing conditions that would permit consistent weed control. Those personnel who achieved good weed control results this year were truly fortunate. The only herbicide product that consistently performed as good in 2006 as it has in the past was MSMA. The reason MSMA performed well during this year's drought is because MSMA is not a highly translocated herbicide, it is considered to be a contact herbicide. MSMA does enter the leaf and stem, but it moves only a short distance before it actually produces its phytotoxic effects. All other herbicides used by ODOT this year such as glyphosate, sulfometuron, glyphosate/2,4-D, sulfosulfuron, and others are all highly translocated herbicides. Hopefully, ODOT personnel who experienced inconsistent or poor weed control results this year will consider the drought conditions and not pass harsh judgment on any particular herbicide that did not perform as well as expected. We can only hope that 2007 will bring a more normal pattern of rainfall so ODOT maintenance personnel can achieve the best weed control possible with their selected treatments and prepare Oklahoma roadsides for the state centennial.

This year only Field Division Eight had a division-wide winter annual weed control program. The remainder of the field divisions, under the direction of OSU personnel, agreed that during Jan. through March of 2006 the drought conditions were severe enough to postpone the scheduled applications of glyphosate/2,4-D + AMS or glyphosate (alone) + AMS. This accounts for a large portion of the reduction in acreage treated this past year. At this time (January 2006) the decision was made based on weather prognostications that the current drought would lift by late May/early June 2006. By the time early summer had come, it was evident that the drought was not going to lift and several field divisions applied their summer glyphosate + sulfometuron

or sulfosulfuron treatments with less than desirable results. This reinforces the difficulties that result when trying to design and administrate an herbicide program where you are basing decisions on weather prognostications. In this droughty year, and considering the herbicides treatments that were applied by ODOT forces statewide, OSU has paid particular attention to what herbicides are most affected by severe drought conditions. It was observed this year that even under drought conditions it may still be beneficial for ODOT to apply the winter annual weed control treatments of glyphosate/2,4-D + AMS or glyphosate (alone) + AMS. ODOT should always remember that with these treatments it is critical that the AMS be thoroughly mixed in the full tank of water before the glyphosate/2,4-D or glyphosate is added. These treatments are cost efficient and it was documented that ODOT may have lost approximately 20% of their effectiveness due to drought. In January 2006, prior to winter annual weed control treatments, the estimated loss of effectiveness from these treatments was in the neighborhood of 50%. The 20% reduction that was actually observed means these particular treatments can still supply beneficial control of the winter annual weed species. In the future OSU will more than likely not recommend a statewide wide postponement of the current winter annual weed control treatments. The summer treatments of glyphosate + sulfometuron or sulfosulfuron were more severely affected by the drought. A major reason is the summer treatments are designed to control perennial weeds such as johnsongrass as well as annual weeds. From the survey comments there is no doubt the translocation of summer treatments was reduced in the perennial weeds allowing them to regenerate from plant parts that were not affected. As mentioned in the previous paragraph, MSMA produced good consistent control of johnsongrass this summer due to its contact activity. While it would take considerable effort, a roadside vegetation manager could follow drought conditions closely during April and May each year and determine whether drought conditions were present. If drought conditions were present and likely to persist, decisions could be made to implement a MSMA summer treatment instead of a glyphosate + sulfometuron or sulfosulfuron treatment. Putting in the additional time and effort to monitor climate conditions would be difficult and basing management decisions on weather prognostications is somewhat of a crap shoot. The difficulties of herbicide program design and administration is another problem that arises when dealing with drought conditions.

ODOT personnel around the state were notified of the current EPA-MSMA reregistration situation on September 26, 2006 in an e-mail from OSU personnel. 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 data and process the EPA used to reach this decision is questionable and deserves further study. ODOT personnel were notified in September that the EPA had a comment period where interested parties could submit comments to the EPA for consideration prior to final EPA decisions. It is in the opinion of OSU personnel that MSMA should be given the opportunity to attempt reregistration through normal EPA reregistration processes. Comments were submitted to the EPA by OSU personnel and all field divisions were also encouraged to submit comments. The loss of MSMA would have a negative affect on ODOT herbicide programs across the state as well as many other MSMA users in the turf and cotton production areas. ODOT will be informed on future EPA/MSMA reregistration decisions as soon as they become available. Even

if substantial registration changes were to occur, it is highly unlikely that any changes would happen so quickly as to affect the use of the product by ODOT in calendar year 2007.

Next year ODOT will have a new herbicide, Milestone VM (new active ingredient aminopyralid) from Dow AgroSciences, available to help control several broadleaf weed problems. We have recently added aminopyralid to its recommendations, after 3 years of field research. We are confident that aminopyralid will be a beneficial herbicide in ODOT weed control programs. Aminopyralid has activity on both emerged broadleaf weeds (postemergence) and broadleaf weeds that have not emerged from the ground (preemergence). Aminopyralid is a soil active (residual) product that will provide several months of broadleaf weed control after the application. The supportive research data shows a minimum of 4 months of control on many weed species. Aminopyralid has a very low risk environmental and safety profile and as a result it received a fast-track registration through the EPA. The two major downsides to aminopyralid are that it has no activity on grassy weeds and it has not shown the ability to control kochia or field bindweed. It has shown the ability to control many of the broadleaf weed species that are commonly found along Oklahoma roadsides. Currently where we see the best fit for aminopyralid is as a tank mix partner with winter annual weed control treatments of glyphosate/2,4-D + AMS or glyphosate (alone) + AMS. The recommended use rate would be to apply aminopyralid at 4 fl. oz. product /Acre (approximately $9.00/Acre). The aminopyralid would only be used on roadsides that have a known summer broadleaf weed problem. The aminopyralid would be applied with the winter annual weed control treatments in late February (southern Oklahoma) through early April (northern Oklahoma) as a preemergence or early postemergence treatment to the summer broadleaf weeds. If winter annual weed control treatments were not scheduled aminopyralid could be applied alone as a summer weed control treatment. If aminopyralid is applied alone it will need the addition of a non-ionic surfactant at a rate of 0.25% volume per volume (1 qt. /100 gallon of water). Aminopyralid can also be applied in late spring or early summer (May through early June) for postemergence control of summer broadleaf weeds, but OSU data indicates it will not provide as broad a spectrum of control as the currently recommended treatment of diglycolamine salt of dicamba. A big advantage of applying aminopyralid in the Feb.-March time frame is that summer broadleaf weed control can be achieved in a safer manner than waiting to treat for summer broadleaf weeds in May or June. In February or March the potential to damage sensitive crops will be less than during May or June when most agricultural crops, vineyards, and home gardens will be more susceptible to herbicide damage. Aminopyralid can still damage susceptible crops, but it's a matter that the Feb./March timing will minimize the potential for off-target damage while still producing the desired summer broadleaf weed control. With the "Elevated Level of Service" for 2007 it appears there will be additional funding available to add Milestone VM to necessary tank loads. We encourage ODOT personnel that are interested in aminopyralid to call OSU personnel or the manufacturer for additional information.

After conducting the September/October divisional herbicide program meetings, it has been requested that ODOT put several herbicides back on the statewide herbicide contract that were taken off in 2005. We will make the request to Alex Calvillo/Maintenance Division that picloram, triclopyr amine, triclopyr ester, fosamine, and glyphosate (aquatic) be placed back on the next statewide herbicide contract (approximately February 2007). Aminopyralid will also be placed on the next statewide herbicide contract. Another request from field divisions was to

return back to a July or August contract date instead of the current February date. OSU personnel will also make this request to Alex Calvillo.

Both Field Division's Two and Six have expressed an interest in using diuron again. In the past, OSU recommended, and ODOT used diuron (Karmex or Direx) to control kochia and other broadleaf & grassy weeds. Diuron produced good kochia and other broadleaf weed control at the OSU recommended use rate of 3.0 lbs. product/Acre + non-ionic surfactant. To use this rate ODOT needed to have a state-issued 2ee label amendment that allowed the use of the 3.0 lb. rate, due to the herbicide label only allowing for rates of a minimum of 5.0 lbs. product/Acre. ODOT had a current diuron 2ee label in place for years, but over time ODOT stopped using the product and thus the manufacturer stopped receiving sales and they eventually stopped supporting the 2ee label. Since ODOT has recently indicated a renewed interest in diuron, OSU looked back into the original diuron product (Karmex 80 DF) and has found that DuPont has removed kochia from the "list of weeds controlled". DuPont, along with other diuron manufacturers, removed kochia from the labeled list because they had consistent failures with diuron and had to pay out to much restitution. Diuron used at high rates on the same area for consecutive years can eventually produce kochia that is resistant to diuron (as well as other weed resistance). ODOT has never used diuron at high rates or in this consecutive fashion to be a big candidate for developing resistant kochia. Based on past ODOT diuron use, diuron should still work well for ODOT as a kochia control herbicide as well as controlling other broadleaf and grassy weeds. This being said, ODOT still needs a diuron product that has the legal labeling to allow ODOT to use it at the 3.0 lb rate. We have asked DuPont to support a new 2ee label for Karmex 80 DF but they have said they are not interested and restated they have removed kochia from their label. OSU has found several generic diuron products that still have kochia labeled on their "list of controlled weeds". One specific formulation doesn't require ODOT to pursue a state-issued 2ee label amendment to allow for the 3.0 lb sub-labeled rate. The products brand name is Diuron 80 WDG from Loveland Industries. In the herbicide label is a specific section on "Roadside Bermudagrass – Oklahoma". This specific information allows ODOT to legally use the product as OSU recommends. This specific product is available in 4 and 25 lb. bags. To our knowledge there are no other diuron products currently available that ODOT can use at the 3.0 lb rate on roadsides to control kochia and other weeds. The current Oklahoma distributor of the Loveland product Diuron 80 WDG is Tollie Green, UAP Distribution Inc, 140 Higher Ground Trail, Hot Springs, AR 71901, office: 501-624-3229, cell: 870-510-8954, e-mail: tollie.green@uap.com. Other distributors, such as Estes and Red River Specialties, may also be able to supply this product but UAP is the main distributor of Loveland products.

In 2006 the Oklahoma Department of Agriculture, Food, & Forestry (ODAFF) formalized new "herbicide drift rules" after conducting several statewide meetings in 2005 and early 2006. The new rules can be found in the current Oklahoma Combined Pesticide Law & Rules at 35:30-17-24.1. The new rules are similar in nature to the herbicide drift rules in the past in that there are designated counties, at designated times of the year, where an applicator cannot apply some or all of the "hormone type" herbicides. The new rules are more detailed than in the past and are more inclusive in that they apply to all herbicide applications instead of just commercial applications. Since the new rules apply to entire counties (instead of portions of counties as in the past) the rules also allow for applications of "hormone herbicides" in restricted areas if the applicator is willing to submit the appropriate pre-application and post-application

notification forms to ODAFF. Currently the five counties that are included in the new rules are in southwestern Oklahoma (Division Five only). With the new rules in place, and the current emphasis on protecting cotton production areas, everyone will need to pay close attention to future changes to the rules which could possibly target vineyards and organic production areas. If these other production areas are included within the new rules, they would dramatically change the scope of the new rules and could affect most, if not all, ODOT field divisions. This item will be monitored closely by OSU personnel.

Across the state most ODOT field divisions have a few roadside ditches or drainages that are filled with cattails. Cattails are there because it's wet and unless you remove the water you will always have cattails reinfesting and clogging these areas. Some of the time these areas are wet because the ditch or drainage is part of the roadside design to carry water off site. Other times it may be a seeping water table or drainage from a nearby pond. In other words you will have to live with the water source most of the time. ODOT has typically used glyphosate (aquatic) with a surfactant and cattail control is variable depending on the herbicide rate and quality of the application. The OSU glyphosate (aquatic) demonstration this year produced about 80% cattail control at the end of the season. The glyphosate (aquatic) rate used was a 1.0% solution + an aquatic-approved non-ionic surfactant at 1.0% solution. This treatment was applied as a spray-to-wet application with a powered handgun. We would like to encourage ODOT to look at the newly labeled herbicide imazapyr (aquatic) under the trade name of Habitat. It is produced by BASF and it has proven this year in OSU demonstrations to provide very high levels of cattail control (99% or greater at the end of the first season) from a single low-volume application using a small nozzle backpack sprayer. The use rate for imazapyr (aquatic) was a 1.0% solution combined with a aquatic-approved non-ionic surfactant at 1.0% solution. At these rates ODOT needs to lightly cover at least 70% of the above ground cattails leaves and stems. Do not spray to the point of runoff as this will not increase control and will waste the herbicide. This treatment will not control cattails that have not emerged from the water. Do not spray this treatment in areas that have desirable tree roots growing among the cattails as it will damage or control many tree species. This treatment will also control willow and cottonwood saplings. The OSU cattail control demonstration treatments will be evaluated in May of 2007 to monitor the level of control 1-year after treatments.

For many years ODOT has used the Calc-An-Acre digital speed devices to accurately monitor sprayer ground speed. The Calc-An-Acre relied on a cable, which ran on the underside of the spray truck, to transmit electronic signals from a sensor/magnet system or from a transmission harness system. Over the years both of these systems have had consistent problems with reliability and durability. The manufacturer of the Calc-An-Acre, Micro-Trak Systems, Inc., has come up with a new system/sensor that does not rely on cable systems on the underside of the vehicle. The new system, called the Astro II GPS Speed Sensor, will work on all old Calc-An-Acre units that have the dial in the front center of the unit. As the name implies, GPS (Global Positioning System), this unit will rely on a signal from a satellite so there will be no cable on the underside of the vehicle only a small receiver on top of the cab or on the truck dashboard. The Astro II sensor has been successfully tested on ODOT spray trucks and has been easy to install and calibrate. At the time of this report OSU is trying to test the Astro II sensor on more ODOT spray trucks to make sure it will work on all vehicles. By design the Astro II sensor should work on any spray vehicle as it is independent of the vehicle, unlike the old sensor/magnet or

transmission harness systems. The Astro II GPS Speed Sensor (Part Number 01410) unit will cost somewhere between $250 and $300/unit depending on the number of units purchased. This item can be purchased from Wylie Sprayers, Oklahoma City, OK, 405-946-4896 (ask for Carlyle). OSU personnel will provide training on the Astro II sensor at the 2007 ODOT CEU Herbicide Applicator Workshops at each field division.

On a final note, OSU personnel were informed this fall by numerous ODOT personnel of Director Ridley's 2007 plan or goal of "Elevated Level of Service". Under the plan ODOT maintenance personnel will be charged with using recent budget increases to produce immediate noticeable results to roadside vegetation while preparing for the Oklahoma state centennial. We have been informed that the "Elevated Level of Service" will involve both mowing and herbicide programs. While the specific details of the "Elevated Level of Service" are still in the making it sounds like each field division will be expected to increase both mowing and herbicide efforts in 2007. Gary Evans/ODOT Director of Operations and Kevin Bloss/State Maintenance Engineer conducted a meeting with OSU personnel on October 16, 2006 to discuss herbicide treatment options for ODOT under the "Elevated Level of Service" plan/goal for 2007. Mr. Evans stated that funds may be available for each ODOT field division to design and implement a division-wide broadcast winter annual weed control program & division-wide broadcast summer weed control program. Broadcast treatment recommendations were discussed with Mr. Evans and Mr. Bloss and this information should be forthcoming to each of the field divisions. If each field division would implement the basic treatments recommended to Mr. Evans, Oklahoma roadsides would have a uniform look for 2007. On a side note, the 2007 treatments that were discussed at the September/October divisional herbicide program meetings did not take into consideration the level of funding that may be available to the field divisions for 2007 herbicide programs. So for some of the field divisions there will be differences between the recommendations they received at the Sept./Oct. meetings with OSU personnel and recommendations they will likely here about in December 2006 (Division Engineer/Maintenance Engineers meetings). There may also be emphasis and funding in place for weed control treatments around guardrails, shoulders, and brush control around concrete structures. The benefits of the new herbicide, aminopyralid (Milestone VM), were also discussed with Mr. Evans and Mr. Bloss as well as funding for this new treatment addition. While there will likely be an increase in herbicide use next year, there will also be increased mowing. Increasing both mowing and herbicide efforts at the same time may lead to some scheduling problems concerning when to mow or when to spray. The Feb-March glyphosate/2,4-D + AMS winter annual weed control treatments should have no affect on mowing as this herbicide treatment should be accomplished well before any ODOT mowing efforts. However, the May-June glyphosate + sulfosulfuron summer weed control treatments will more than likely have to be scheduled during mowing programs. In all likelihood, most field divisions will mow once, maybe even twice before the application of summer weed control treatments. The key thing to remember is that you must have a minimum of 14 days (minimum of 18 inches of johnsongrass regrowth) from the time of mowing until this treatment is applied or once the treatment is applied, a minimum of 10 days until a mowing. Failure to leave the 14 day period will reduce the weed control achieved from the summer glyphosate + sulfosulfuron treatments. If conditions are dry the 14 day delay period may need to be extended to reach to proper johnsongrass regrowth to allow for proper absorption of the glyphosate + sulfosulfuron herbicides. Leaving less than 10 days from treatment time till a mowing can also reduce weed control because the herbicide may not be completely translocated downward in the plant.

Table 9. Summary of 2006 ODOT herbicide treatments, target weeds and total acres treated with herbicides in Oklahoma.

Herbicide Treatment	Target Weed	Divisions Using Treatment(s)	Total Acreage Treated
atrazine	winter annual weeds		0
glyphosate/2,4-D +/- AMS +/- Others	winter annual weeds	1, 3, 4, 7, 8	9,601
glyphosate + sulfometuron	johnsongrass and summer annual weeds	1, 2, 4, 5, 6, 8	27,971
glyphosate + sulfosulfuron	johnsongrass and summer annual weeds	1, 3, 8	8,275
glyphosate + imazapic	johnsongrass and summer annual weeds	5	80
MSMA +/- sulfometuron, sulfosulfuron, imazapic	johnsongrass and summer annual weeds	1, 2, 5, 7	7,648
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	2,669
bromacil bromacil/diuron	total vegetation control	4	60.5
triclopyr ester diglycolamine salt of dicamba	general broadleaf weed control	2, 4, 5, 6	142
dicamba/diflufenzopyr +/- Others	musk thistle	2, 4, 5, 6, 7	5
clopyralid +/- Others	musk thistle	4, 7, 8	365
triclopyr ester + diesel	basal brush control	1, 7, 8	5.5
picloram + triclopyr ester	foliar brush control	2, 8	100
triclopyr ester or amine	foliar brush control	1, 2, 7	23.5
imazapyr (aquatic)	aquatic vegetation control	4	7.5
glyphosate (aquatic)	aquatic vegetation control	5, 7	58
triclopyr amine	aquatic vegetation control	7	2
Total			57,013

Table 10. Comparison of herbicide acreages treated in 2003, 2004, 2005 and 2006 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
		atrazine (winter annual weed control)	glyphosate/ 2,4-D +/- AMS (winter annual weed control)	glyphosate + sulfometuron (johnsongrass control)	glyphosate + sulfosulfuron (johnsongrass control)	MSMA +/- sulfometuron/ sulfosulfuron (johnsongrass control)	glyphosate (johnsongrass control)	
1	2003	170	5,356	862	4,794	0	222	11,404
	2004	0	5,662	0	16	0	168	5,846
	2005	0	5,892	64	309	0	42	6,307
	2006	0	1,561	3,639	2,287	0	507+	7,994
2	2003	5,197	0	4,666	0	1,372	1,500	12,735
	2004	1,558	0	2,183	0	216	0	3,957
	2005	5,862	0	6,282	0	650	113	12,907
	2006	0	0	2,901	0	1,299	531	4,731
3	2003	0	8,089	0	6,691	0	0	14,780
	2004	0	6,983	0	6,924	0	0	13,907
	2005	0	7,724	0	7,542	0	0	15,266
	2006	0	660	0	2,713	0	0	3,373
4	2003	606	562	915	0	80	1	2,164
	2004	0	5,682	4,023	0	838	0	10,543
	2005	0	5,234	5,612	0	0	0	10,846
	2006	0	688	5,977	0	0	0	6,665
5	2003	0	9,851	6,356	0	510	1,646	18,363
	2004	0	9,795	3,246	0	687	1,450	15,176
	2005	0	8,775	7,317	0	2,444	1,053	19,589
	2006	0	0	7,700	0	2,010	240	9,950
6	2003	2,273	0	7,541	0	0	0	9,814
	2004	4,158	0	2,945	250	0	0	7,353
	2005	817	1,450	5,481	0	0	0	7,748
	2006	0	0	6,054+	0	0	0	6,054
7	2003	3,611	3,830	0	0	4,147	488	12,076
	2004	3,405	4,206	0	1,230	3,710	282	12,833
	2005	109	7,074	0	0	8,126	0	15,309
	2006	0	534	0	0	3489	0	4,023
8	2003	0	4,693	3,700	0	0	0	8,393
	2004	0	5,124	600	0	0	0	5,724
	2005	0	6,254	4,230	0	0	100	10,584
	2006	0	5,309	1,700	3,275	0	0	10,285
All Divisions	2003	11,857	32,381	24,040	11,485	6,109	3,857	89,729
	2004	9,121	37,450	12,997	8,420	5,451	1,900	75,339
	2005	6,788	42,403	28,986	7,851	11,220	1,308	98,556
	2006	0	8,752	27,971	8,275	6,798	1,278	53,074

Table 11. 2006 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
herbicide	Diuron	Karmex 80DF	Dupont
	Diuron	Direx 80DF	Griffin
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/diuron	Sahara	BASF
herbicide	Metsulfuron methyl	Escort	Dupont
	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	Oust	Dupont
	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
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
		Pointblank WM	Helena
dry ammonium sulfate (adjuvant)		Royal AMS	Estes
dry ammonium sulfate w/drift control (adjuvant)		Array	Estes
		Dry Poly Wet	Red River Specialties
		StrikeZone PPS	Helena

APPENDIX A

2006 ODOT/OSU HERBICIDE PROGRAM SURVEY

2006 ODOT/OSU Herbicide Program Survey (2 pages)

Please return to your Division Headquarters on or before Aug. 25, 2006, 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 tankload? **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 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 (check all that apply)?

   Roundup Pro ___ Roundup Pro Concentrate ___ Mirage ___ Glystar Pro ___ other ___
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. Did you have any contract herbicide applications performed in your maintenance area? If yes, please include a brief description. **yes_____ no _____**

_____

_____

Summary of 2005/2006 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***	***3-15-06***	***4-7-06***	***15***	***43.3***	***649.5***	***xxx***		
atrazine										
Campaign + AMS										
Roundup Pro + Oust										
Roundup Pro + Outrider										
Roundup Pro + Oasis										
MSMA + _____										
Roundup Pro (alone)										
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.