INTRODUCTION

In the early 1990s, the Texas Department of Transportation (TxDOT) initiated an environmental review of its Roadside Pest Management Program (PMP). This review resulted in a Final Environmental Impact Statement (FEIS) and Record of Decision (ROD), completed in 1996. As a result of this FEIS and ROD, TxDOT adopted new pest management practices, policies and procedures which aim at using the most economical and environmentally sensitive treatment technologies available. Subsequently, a Supplemental Environmental Impact Statement (SEIS), to document changes in the PMP since 1996 and the potential impacts of those changes on the environment, has been drafted. This document shall serve as the Record of Decision for this Final SEIS.

Consistent with TxDOT's mission and vision, to be a progressive state transportation agency recognized and respected by the citizens of Texas, the purpose of the PMP is to protect the public's investment in transportation infrastructure, promote an aesthetically appealing and environmentally sensitive transportation system, and provide worker and traveler safety. The objectives of the PMP include:

- Ensuring the safety of highway users and TxDOT maintenance personnel
- Preventing erosion in the right-of-way through the establishment of permanent vegetative cover
- Enhancing environmental protection within and adjacent to the highway corridor
- Promoting and preserving native wildlife habitats and native flora in each of the ten vegetative regions of Texas
- Promoting the coordination and efficiency of maintenance activities
- Eliminating pest species that compromise the integrity of TxDOT's infrastructure
- Maintaining clear line of sight and travel ways, eliminating obstructions, and removing hazards in a manner consistent with TxDOT's design specifications.
- Reducing the occurrence of stinging, biting, nuisance insects originating within the right-of-way
- Promoting the propagation of wildflower and native plant species within the right-of-way

All of the PMP alternatives that were considered utilized some combination of the following four management techniques:

1. *Mechanical Management Techniques*

Mechanical management techniques are those that physically alter the right-of-way environment, or target specific pest species via mechanical equipment and/or manual labor. These techniques can include mowing, string trimming, pruning and scraping. Mowing is performed in one of three methods. Full-width operations, which occur over most of the treatable area of the right-of-way and are timed to avoid sensitive wildlife nesting periods and seed-producing periods for desirable vegetation. Strip mowing targets vegetation adjacent to the roadway shoulder to reduce fire danger and avoid view obstructions and is performed in scheduled cycles. Spot mowing is performed on an as-needed basis to maintain sight distances and clean blocked drainage ditches.

Based on the results of a National Cooperative Highway Research Program (NCHRP) survey presented in Synthesis 341, Integrated Roadside Vegetation Management (Berger, 2005), most transportation agencies use mechanical pest control methods as the primary means of pest control, and TxDOT follows this trend, with mechanical management being the primary method currently in use. With the exception of the No Action alternative, all other alternatives presented in the SEIS rely on mechanical treatment as the primary means for managing pest species within the right-of-way.

2. *Chemical Management Techniques*

The use of pesticides in a PMP is categorized as chemical management. TxDOT applies the majority of pesticides via trailer-mounted units and truck-mounted sprayers. Ropewick applicators are used with less frequency, but are used by TxDOT. Spot chemical management treatments are performed by TxDOT personnel using hand-held spot sprayers and/or back pack spray units. Pesticides are used to both control specific species and to yield bare ground results if necessary near the edge of pavement or on paved shoulders. The most common pesticide applications are to treat for mosquitoes and fire ants. Fire ants occasionally nest in signal boxes and can cause mechanical failures and threaten worker safety.

According to Berger (2005), herbicides have changed from the broadly non-selective, high-use rate materials of the 1940s to the very selective, low-use rate materials available on today's market. Special formulations of active ingredients allow placement to be targeted and efficient. The EPA currently approves of the use of thousands of different pesticides.

3. *Cultural Management Techniques*

Cultural techniques are intended to specifically target local pest species while increasing the propagation of desirable species. These techniques ranged from selection of the most effective chemical application method (i.e. – rope wick, broadcast or spray) for a given pest species and local site conditions to height-restricted and seasonally-adjusted mowing to target taller weed species. Removal of weeds prior to going to seed, and regular cleaning of mechanical equipment to prevent the spread of invasive/noxious species are other cultural management techniques. In

addition to chemical and mechanical, use of certified seed mixtures to reduce the introduction of weed and invasive/noxious plant species is part of cultural management.

4. *Biological Management Techniques*

   Biological management involves the introduction of predator species to control pest species and relying on the predator-prey relationship for management of these pest species. Predators can range from bacteria introduced to control mosquitoes to beetles introduced to control specific plant species.

ALTERNATIVES

In the 1996 FEIS for the PMP, TxDOT considered five program alternatives; No-Action (Alternative A), Short-Term Remedial Action (Alternative B); No-Chemical (Alternative C); Current Practices (Alternative D); and the Integrated Long-Term and Locally Based Alternative (Alternative E). This SEIS is seeking the most cost effective and environmentally sensitive treatment methods, techniques, technologies and management practices for the TxDOT PMP. Since the 1996 FEIS, there has been an increase in the use of third-party contracting for roadside maintenance and the addition of new chemicals into the program. Based on the changes in the program and input received during the scoping process, the program alternatives presented in the 1996 FEIS were modified, and the following five alternatives were evaluated in the SEIS:

- No-Action
- Short-Term Remedial Action
- No-Chemical
- Integrated Pest Management (IPM) (Current Practices)
- Outsourcing

A brief description of each alternative follows:

No-Action

The No-Action Alternative consists of the elimination of TxDOT's PMP and serves as a baseline for comparison. Under this alternative, no pest management activities would be implemented.

Short-Term Remedial Action

The Short-Term Remedial Action Alternative would only implement the recommended PMP techniques and practices when traveler safety, facility functionality, or the integrity of TxDOT's capital investments (roadways, bridges, rest stops, etc.) is threatened. These threats consist of sight distance obstructions, sign view obstructions or travel way obstructions due to vegetation, reduced facility functionality when drainage ditches become overgrown causing flooding of the roadway, and the presence of biting and stinging insects in access areas for TxDOT maintenance personnel.

Under this alternative, TxDOT would invest the minimum amount of time, labor and money necessary to treat problem areas and critical needs as they arise. This alternative relies heavily on chemical and mechanical treatments and "spot" control intended to yield immediate results.

No-Chemical

The No-Chemical alternative consists of mechanical, cultural and biological treatments. Under this alternative, TxDOT would not use pesticides for pest management, but would rely primarily on mechanical control methods (mowing and some grading) to manage roadside pests. This alternative also includes manual labor, weed eating, and pruning. Without using chemicals, manual labor is required to treat areas around fixed objects such as guardrails and road signs that are inaccessible by machinery.

Integrated Pest Management (IPM) (Current Practices)

The current practice, and fourth alternative, for TxDOT is Integrated Pest Management (IPM). This management practice is defined by the U.S. Environmental Protection Agency (EPA) as the coordinated use of pest and environmental information with available pest control methods to prevent unacceptable levels of pest damage using the most economical means and with the least possible hazard to people, property, and the environment (EPA, 2005). TxDOT's current IPM is consistent with this definition and includes training, research and development, and a blend of cultural, chemical and mechanical methods. The goal of the program is to maximize efficiency, return on investment, and worker and public safety while minimizing environmental impacts.

In addition, TxDOT is currently involved in the design and production of PMP equipment and machinery, research and development, and third party contracting. TxDOT maintains designated herbicide test areas where chemical application techniques are refined to provide the necessary vegetation controls along state roadways.

Outsourcing

The final alternative considered for the SEIS is outsourcing TxDOT's PMP to private third-party vendors. It can be expected that third-party vendors would utilize chemical and mechanical methods of treatment and would use "spot" control as the primary means of pest management. Third-party vendors would maintain their own chemical inventories and equipment and be responsible for the training and conduct of their employees. The various TxDOT districts would administer the performance-based contracts and oversee the work performed, yet still provide the third-party vendors with the flexibility to use whatever means necessary to achieve the desired PMP results.

AFFECTED ENVIRONMENT

The SEIS evaluated the following categories to determine the affected environment for each proposed alternative. The environmental effects to each category for each alternative are summarized below. More specific details and information about potential environmental effects can be obtained in the SEIS, Chapter 3.

Geology and Soils

For the no-action alternative, increased soil erosion, reduced soil productivity and slope failure could result. The short-term remedial action alternative has the same potential impacts to geology and soils, and has a potential to introduce chemicals to the soil. The no-chemical alternative has the potential to result in higher soil compaction, soil erosion and slope failure due to increased mechanical treatments. The IPM alternative has greatly reduced possibilities of any impacts to geology and soils. The outsourcing alternative could cause soil compaction, soil erosion and introduction of chemicals to the soil.

Water Quality

The no-action alternative has the potential to increase sediment loading and turbidity, due to increased erosion, and increase in nutrient laden runoff decreasing dissolved oxygen. The short-term remedial action alternative has the potential to increase introduced chemicals to waterways and may increase sediment loading and turbidity due to increased erosion. The no-chemical alternative, by means of increasing the frequency of mechanical treatment methods, has the potential to increase sediment loading and turbidity due to the disturbing of soils from these mechanical methods. The IPM alternative has the potential to introduce chemicals to waterways, but has a lesser potential for causing increases in sedimentation or nutrient laden runoff. Outsourcing could be similar to any of the other alternatives, dependant on the contract controls imposed by TxDOT for the third-party contractor.

Wetlands

The no-action alternative may have a negative effect on wetlands from various issues ranging from sedimentation to invasive/noxious species. Short-term remedial action may suffer the same effects as no-action, but would require more intensive treatments to alleviate the negative effects on wetlands within the right-of-way. The no-chemical alternative could have negative impacts to wetlands due to increased mechanical treatment methods. The effects of the IPM alternative have the potential to introduce chemicals to the waters of wetlands, and increase sedimentation. Outsourcing could be similar to any of the other alternatives, dependant on the contract controls imposed by TxDOT for the third-party contractor.

Floodplains

The no-action alternative could have a positive impact on floodplains, but this would be overridden by the negative impacts to safety and capital investments. The short-term remedial action alternative could slightly increase runoff due to vegetation removal, but the overall effect to floodplains would be negligible. The no-chemical and IPM alternatives would have similar potential impacts to the short-term action. Outsourcing could be similar to any of the other alternatives, dependant on the contract controls imposed by TxDOT for the third-party contractor.

Vegetation

All alternatives outside of the no-action alternative are intended to have a somewhat negative impact on vegetation through chemical or mechanical methods, impacts would still result from these alternatives. The no-action alternative would allow greater vegetation growth, but this growth could cause negative impacts to traffic safety, TxDOT maintenance worker safety, and allow invasive/noxious species to spread. The short-term alternative would have a similar basic impact to the no-action alternative, but when treatment is required, this treatment would need to be very intensive. The no-chemical alternative could allow an increase in growth of plants within the right-of-way due to reliance on mechanical methods, and would increase vegetation maintenance costs. The IPM alternative allows the most environmentally sensitive approach to controlling vegetation while avoiding significant negative impacts. The effects of the outsourcing alternative would likely be similar to those of the short-term alternative.

Wildlife and Wildlife Habitat

The no-action alternative would allow wildlife to expand naturally. This could cause safety issues for users of roadways and roadside parks, as well as cause spreading of undesirable pests to adjacent properties where TxDOT would not have control over the treatment methods. The short-term remedial action alternative could be expected to decline over the long-term, as pest species would be allowed to exist unaffected until they become a nuisance, at which point they would be eliminated. The no-chemical alternative could affect wildlife through the mechanical maintenance methods used in this alternative, but would not be affected by any chemical applications. The IPM alternative could present the least impact on wildlife, controlling only pest species, and being sensitive to the requirements to maintain habitats in the right-of-way. Outsourcing could be similar to any of the other alternatives, dependant on the contract controls imposed by TxDOT for the third-party contractor.

Socioeconomic

The no-action alternative would have a significant socioeconomic effect due to increase in overgrowth, loss of visual quality, loss of TxDOT maintenance jobs, and lack of pest control. The short-term remedial alternative would have a socioeconomic effect through reduced visual quality and due to the nature of the program, better maintenance in areas with more involved residents.

Resident involvement can be impacted by time, resources, language and income restraints, causing these areas to be neglected for vegetative and pest remedial actions. The no-chemical approach may have positive socioeconomic benefits in creating additional maintenance personnel jobs due to the mechanical methods used in this alternative, but this alternative is not expected to maintain the right-of-way or capital improvements as well as other alternatives. The IPM alternative would balance chemical and mechanical methods to ensure that the right-of-way is maintained in an aesthetically-pleasing manner with proper pest control in all areas, regardless of population characteristics, and could have indirect economic benefits to the tourism industry. Outsourcing could be similar to any of the other alternatives, dependant on the contract controls imposed by TxDOT for the third-party contractor.

Safety

The no-action alternative could have the most negative impact to safety, as unchecked vegetation growth and pest presence could cause accidents, injuries, and lead to public relations issues and lawsuits. The short-term remedial action alternative would have impacts similar to those in the no-action alternative, although this alternative would allow for treatment of the most pressing safety issues. The no-chemical alternative would require greater presence of and use of mechanical methods which could lead to more potential safety issues between personnel, traffic and machinery. The IPM alternative provides the best potential for maintaining a safe right-of-way for all parties. Outsourcing could be similar to any of the other alternatives, dependant on the contract controls imposed by TxDOT for the third-party contractor.

Traveler Facilities

The effects of the five alternatives to traveler facilities would be similar to the effects on safety; traveler facilities could be impacted by any uncontrolled vegetation growth or pest infestation. The various levels of control in each alternative could reduce these effects.

Cultural Resources and Archeological Resources

The no-action alternative would allow overgrown conditions which would hinder the view of historic resources in the right-of-way but would otherwise result in negligible impacts to historic and cultural resources. The short-term alternative could also have an effect from overgrown conditions, but could also impact historic resources through chemical or mechanical "spot" treatments. The no-chemical alternative's reliance on mechanical methods could damage historical resources. The IPM alternative would minimize the potential damage to historic and cultural resources while accomplishing TxDOT's program objectives. Outsourcing could be similar to any of the other alternatives, dependant on the contract controls imposed by TxDOT for the third-party contractor.

Hazardous Materials and Waste

The no-action alternative would not cause any generation, storage, or disposal of hazardous waste, although unchecked vegetation and pest species could cause an increase in the usage of hazardous materials outside the right-of-way by private landowners. The higher concentration of chemicals and more intense treatments of the short-term remedial alternative could cause an increase in hazardous materials being stored and/or wasted. The no-chemical alternative would reduce the amount of pesticides, but some mechanical treatments, as required in this alternative, could generate hazardous waste due to the increased use of machinery. The IPM alternative would generate hazardous material storage and waste through the use of chemicals and machinery, but these storage and waste effects will be much less with the IPM alternative than any other alternative. Outsourcing could be similar to any of the other alternatives, dependant on the contract controls imposed by TxDOT for the third-party contractor.

Visual Quality

The no-action alternative could allow overgrowth which will negatively impact the visual quality in the right-of-way. The short-term remedial action alternative could allow overgrowth as well, and "spot" treatments typically lead to cut material remaining in-place, further negatively impacting the visual quality in the right-of-way. The no-chemical alternative would allow vegetation to grow in the paved shoulder, as well as cause thicker and fuller re-growth in cut areas, both of which would negatively impact the visual quality in the right-of-way. The IPM approach's combination of methods would allow for the greatest maintenance of the visual quality in the right-of-way. Outsourcing could be similar to any of the other alternatives, dependant on the contract controls imposed by TxDOT for the third-party contractor.

Air Quality

The no-action alternative could have secondary effects which degrade air quality, including accidents causing backups and idling engines. The short-term alternative would cause a long-term increase in emissions due to constant mobilizing of equipment for "spot" treatments. The no-chemical alternative will improve air quality related to chemicals, but the reliance on mechanical treatment methods will increase emissions. The IPM alternative will cause both chemical releases and emissions, but both will be in smaller overall quantities than in the other alternatives, presenting the best possible scenario for air quality. Outsourcing could be similar to any of the other alternatives, dependant on the contract controls imposed by TxDOT for the third-party contractor.

PUBLIC PARTICIPATION

Extensive public participation was a critical component of the SEIS process. The FEIS and the accompanying ROD were reviewed as part of a larger interactive effort to develop a comprehensive list of agencies and special interest groups (SIG) which participated in the original FEIS process and those that man be interested in the TxDOT Roadside PMP. Specific points of contact were

established for all agencies and SIGs on the list, and an open Agency/Stakeholder Scoping Meeting was held. TxDOT published a Notice of Intent (NOI) in the Texas Register on June 17, 2005. A Summary and Analysis report of the Agency/Stakeholder Scoping process was produced for the SEIS.

A total of 96 scoping letters to identified agencies and SIGs were sent on May 9, 2005. One e-mail and one phone call response to these letters was received. Questions in these communications were answered, and the senders were encouraged to attend the open meeting which occurred on June 6, 2005. At this meeting, a total of eight individuals representing various agencies and SIGs were present. Comments were encouraged at the meeting, both verbally and on comment forms which were provided for completion at the meeting, or mailed in the future.

The majority of the comments received focused on the management practices used by TxDOT for both their own employees and third-party contractors when using chemical treatment methods of pesticides. Comments also addressed issues of suggested practices for reducing pesticide usage and protecting federally protected species occurring within or near the right-of-way. The comments that were received during the scoping process indicated that the TxDOT Roadside PMP does an excellent job of managing roadside pests in an environmentally and economically sensitive manner. Participants in the scoping process understand the need for pest management and support TxDOT's integrated pest management approach.

In addition to making copies of the Draft SEIS available to all participants in the scoping process, public hearings were held to receive comments on the DSEIS in late November, 2006 and early December, 2006. Hearings were held at the TxDOT District Offices in Austin, Dallas, Beaumont, Pharr, and Lubbock, Texas. Public notices of these hearings were published in the Dallas Morning News, Fort Worth Star-Telegram, Beaumont Enterprise, Lubbock Avalanche-Journal, Amarillo Globe News, Corpus Christi Caller-Times, Odessa American, San Antonio Express-News, the Austin American-Statesman, and the Monitor. The public hearing notice was published in the newspapers of general circulation at least 30 days prior to the hearing and again 10 days prior to the hearing. At each public hearing, a registration table was located at the front entrance with nametags and comment forms, but there were no attendees at any of the five public hearings.

The only comments received from the public hearing process were letters from various agencies, including Texas Parks and Wildlife Department, Texas Historical Commission, United States Natural Resources Conservation Service, National Marine Fisheries Service, United States Geological Survey, and Coastal Coordination Council. These comments and the responses to the comments can be found in the SEIS, Chapter 7.

DECISION RATIONALE

The selection of a recommended alternative was based on a decision matrix evaluating the five alternatives based on potential environmental impact in twelve categories divided into thirty four specific impact areas.

The geology and soils category was divided into four impacts. These are introduction of chemicals into soils, reduced soil productivity, soil compaction and slope/bank destabilization. The impacts for the recommended alternative in this category were typically moderate to minor. The worst-performing alternatives in this category were short-term remedial action and outsourcing, and the best-performing alternative was no-chemical.

The water quality category was divided into four impacts. These are surface water quality impairment, groundwater quality impairment, increase in sedimentation/turbidity and decrease in dissolved oxygen content. The impacts for the recommended alternative in this category were moderate to minor. The worst-performing alternatives in this category were no-action, short-term remedial action and outsourcing, and the best-performing alternatives were no-chemical and IPM.

The wetlands category was divided into four impacts. These are alters hydrology, reduces species richness, enhance native species composition and loss of function/values. The impacts for the recommended alternative in this category were typically minor to negligible. The worst-performing alternatives in this category were no-action, short-term remedial action and outsourcing, and the best-performing alternative was IPM.

The floodplains category was divided into two impacts. These are increased floodplain elevations and increased floodwater storage capacity. The impacts for the recommended alternative in this category were moderate. All alternatives were equally ranked for impacts in this category.

The vegetation category was divided into three impacts. These are increase in invasive/noxious species, decreased species diversity and reduction in native species. The impacts for the recommended alternative in this category were minor. The worst-performing alternative in this category was no-action, and the best-performing alternative was IPM.

The wildlife and habitat category was divided into four impacts. These are loss of wildlife habitat, increase in invasive/noxious and/or pest species, wildlife mortality and adverse effects on reproduction. The impacts for the recommended alternative in this category were minor to major, with the worst impact for all categories being to adverse effects on reproduction. The worst-performing alternative in this category was outsourcing, and the best-performing alternative was IPM.

The socioeconomic category was divided into three impacts. These are decreased employment opportunities, disproportionate impacts to EJ populations and reduction in tourism. The impacts for the recommended alternative in this category were minor to moderate. The worst-performing alternatives in this category were no-action and short-term remedial action, and the best-performing alternative was no-chemical.

The safety category was divided into three impacts. These are compromised traveler safety, compromised TxDOT employee safety and creates fire hazard. The impacts for the recommended alternative in this category were moderate to minor. The worst-performing alternative in this category was no-action, and the best-performing alternative was IPM.

The historic and cultural resources category was divided into two impacts which are obscured views of cultural resources and damage to cultural resources. The impacts for the recommended alternative in this category were moderate to negligible. The worst-performing alternative in this category was no-chemical, and the best-performing alternative was no-action followed closely by IPM.

The hazardous materials and waste category was divided into two impacts which are generation of hazardous materials/wastes and increase in illegal dumping. The impacts for the recommended alternative in this category were moderate. The worst-performing alternatives in this category were short-term remedial action and outsourcing, and the best-performing alternative was no-chemical.

The visual quality category was divided into two impacts which are reduction in wildflower populations and altered landscape. The impacts for the recommended alternative in this category were minor to negligible. The worst-performing alternative in this category was no-action, and the best-performing alternative was IPM.

The air quality category was divided into two impacts which are equipment emissions and air toxics/chemical volatilization. The impacts for the recommended alternative in this category were moderate. The worst-performing alternative in this category was no-chemical, and the best-performing alternative was no-action.

The IPM approach, the current practice of TxDOT, scored the highest overall in six of twelve categories and was near to the highest score in many of the other categories. The worst-performing impact for the IPM approach was a major impact to wildlife and habitat in the area of adverse effects on reproduction. In all other categories, the IPM approach typically scores in the moderate to minor impact range. Therefore, the IPM approach was selected as the preferred alternative.

DECISION

The alternative PMP which best fits the TxDOT objectives and which was selected through a systematic, interdisciplinary approach and evaluation, is the IPM (Current Practices). In evaluating the alternatives, each alternative was assigned a numerical value from one to five, indicating a high (one) to low (five) potential impact for each of thirty four impacts in twelve categories. The alternative with the highest score, indicating the most low impacts and therefore the fewest adverse environmental impacts of any of the alternatives under consideration, was the IPM alternative.

The IPM approach will continue to focus on improvement from economic, environmental and treatment efficacy perspectives. Through continuous monitoring, research and development of new technologies and testing, new policies and procedures are introduced and integrated into the TxDOT PMP when appropriate with the IPM approach. Adverse environmental impacts associated with the PMP are monitored and minimized by the TxDOT ENV through continuous data collection.

MANAGEMENT REQUIREMENTS AND MITIGATION MEASURES

In order to implement the recommended alternative PMP and avoid adverse environmental consequences, the following best management practices (BMPs) should be implemented along with the recommended alternative;

- Limit the operation of heavy machinery to areas with slopes that are greater than 33 percent consisting of stable soils;
- Avoid driving heavy machinery through wet and/or inundated areas to prevent rutting and/or turbidity;
- Clear and grade ditches and drainage ways during dry months to minimize turbidity in downstream water bodies;
- Avoid mowing when sustained wind speeds are higher than normal for a given area to minimize dust;
- Properly maintain all equipment to optimize fuel and treatment efficiency and to ensure operator safety;
- Identify known historic resources occurring within the right-of-way and select the pest management treatment technique least likely to impact the identified resources according to site and resource specific considerations (Refer to specific examples of recommended treatment methods discussed in SEIS Section 3.10.1.3.1 under IPM Current Practices);
- Demarcate no-mow zones to avoid impacts to species of concern and/or protected species as appropriate for the species;
- Schedule mowing and trimming of areas known to contain species of concern and/or protected species, as appropriate for species propagation to the greatest extent practicable;

- Limit the use of heavy machinery in areas known to contain ground nesting bird species during the nesting season and maintain appropriate buffer zones to the greatest extent practicable when nesting birds are observed;
- Schedule and conduct mowing and other PMP treatments during off-peak traffic hours, and;
- Provide right-of-way access to appropriate State and Federal agencies to conduct comprehensive vegetation surveys and other studies deemed necessary to enhance TxDOT's PMP.

For any alternative with a chemical treatment component, the following BMPs would reduce the potential adverse environmental effects:

- Establish buffer zones for the application of pesticides adjacent to surface water bodies or aquifer recharge features like crevices, sinkholes, or caves (i.e., karst features);
- Establish buffer zones for the application of pesticides adjacent to sensitive crop species;
- Discontinue spray application of chemicals when the pesticide can no longer be kept on the target plant species;
- Ensure that equipment is properly calibrated and equipped to produce larger spray droplet sizes to reduce the potential for drift;
- Amend chemicals with drift control agents;
- Clearly demarcate no spray areas of the right-of-way with permanent markings like paint on the pavement or signage;
- Adhere to all label instructions concerning timing, application rates, use restrictions, personal protective equipment, timing of re-entry, and proper rinsing, disposal, and recycling of empty containers and wastes;
- Select treatment chemicals according to target pests, efficacy, and potential impacts on non-target species on a site specific basis;
- Avoid applying chemicals during or just prior to precipitation events;
- Use target-specific spot application when practical;
- Apply chemicals at optimal point in pest species life cycle;
- Avoid the application of chemicals to edible plants and/or fruit bearing plants that may be consumed by wildlife or people, and;
- Apply chemicals as part of a situation specific, integrated solution for pest management.

The previous BMPs relate to minimizing adverse environmental effects associated with specific treatment techniques. In addition to these BMPs, an IPM approach also includes:

- Training personnel in application techniques, equipment operation, identification of protected species and species of concern, identification of cultural resources, and safety and legal requirements;
- Maintaining dense, healthy vegetation to reduce erosion impacts to soils and water quality, while resisting invasion by undesirable plants;
- Researching, developing and testing new pest management technologies and techniques;
- Adapting PMP strategies as new environmental impact data become available;
- Instituting an Environmental Management System;
- Reviewing and periodically updating PMP Manuals;
- Developing inventories of sensitive habitat features and/or species located within the right-of-way;
- Developing an inventory of cultural resources within the right-of-way, and;
- Researching, developing and testing new context sensitive infrastructure designs, which reduce the need for PMP activities.

This document will become effective on the date signed.

Texas Department of Transportation
Environmental Affairs Division

1-31-08
Date