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Southwest Pink Bollworm Eradication Program

Supplemental Environmental Assessment,
April 2008

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Agency Contact:
William Grefenstette
National Coordinator
Cotton Pest Programs
Plant Protection and Quarantine
Animal and Plant Health Inspection Service
U.S. Department of Agriculture
4700 River Road, Unit 138
Riverdale, MD 20737–1236

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I. Need for the Proposed Action

The pink bollworm, *Pectinophora gossypiela* Saunders, is one of the most important pests of cotton in the United States. There have been various control programs initiated by Federal, State, local, and commercial organizations in various parts of the U.S. Cotton Belt. The Animal and Plant Health Inspection Service (APHIS) with its cooperators, in response to the Southwest's cotton producers' agricultural losses and requests for assistance, initiated the Southwest Pink Bollworm Eradication Program in 2002 to address the ongoing damage to cotton from this pest in the southwestern United States and northern Mexico. APHIS prepared an environmental assessment (EA) and a finding of no significant impact (FONSI) for that program (USDA, APHIS, 2002). The findings of those documents are summarized in this supplemental EA and their determinations are incorporated by reference into this supplement.

Since the initiation of this program, successful eradication efforts have been achieved in parts of Texas, New Mexico, and Arizona. This eradication benefits not only the cotton growers through reduced need for insecticide applications, but the lower use of pesticides benefits the environmental quality of the cotton fields and adjoining areas.

Successful eradication is contingent upon having the available resources in a timely manner to reduce pest populations to the extent that outbreaks can be prevented and prophylactic actions such as sterile insect releases can effectively lower the existing pest population. Use of the present program pesticides are limited to those fields where a population of pink bollworm moths has been detected. Applications have generally been very effective, but the number of applications permitted on the pesticide label has been found to be insufficient to lower elevated pest populations at certain sites to levels where other control measures can achieve effective control over the long growing season. For these situations, the program has determined that there is a limited need for availability of other pesticides for use to augment eradication efforts at these locations where population reductions are needed late in the growing season. The program expects to use these other pesticides on a very limited number of fields to clear any lingering pest populations. Therefore, the program is proposing to include additional chemical applications for these locations where further pest population reductions are required to achieve eradication.

APHIS' authority for cooperation in the program is based upon the Plant Protection Act (Title 4 of the Agricultural Risk Protection Act of 2000), which authorizes the Secretary of Agriculture to carry out operations to eradicate insect pests and to use emergency measures to prevent the dissemination of plant pests that are new to or not known to be widely prevalent or distributed within or throughout the United States. This environmental assessment (EA) is prepared in compliance with the National Environmental Policy Act of 1969 (42 U.S.C. 4321–4327) and Executive Order 12114 (“Environmental Effects Abroad of Major Federal Action”).

II. Alternatives

The three alternatives considered in the Southwest Pink Bollworm Eradication Program EA (USDA, APHIS, 2002) include: (1) no action (no change in the existing program), (2) pink bollworm suppression, and (3) pink bollworm eradication (the proposed alternative). In this supplement to that EA, the program decision is limited to a determination of whether to incorporate the use of three alternate chemicals into the methods applied by the present eradication program. Therefore, the alternatives considered in this supplement are limited to (1) no action (no change in the ongoing eradication program) and (2) augmentation of program methods of chemical control (the proposed alternative).

A. No Action

The no action alternative involves maintaining the present eradication program as described in the preferred alternative of the program EA (USDA, APHIS, 2002). Operational aspects of this program include: (1) mapping to identify cotton field locations, acreage, and genotypes; (2) detection by trapping and visual inspection; and (3) control using a variety of approved methods. Control for the pink bollworm program includes cultural control (uniform planting and harvesting to provide a necessary host-free period), mating disruption (pheromone only or pheromone with permethrin, depending upon population density), transgenic cotton, sterile moth releases, and chemical control (aerial or ground applications of chlorpyrifos or permethrin).

In Mexico, in the State of Chihuahua, the program involves the elimination of localized pest infestations to ensure that there is no potential for spread and reinfestation of eradicated areas within Mexico and the United States.

The potential environmental consequences and additional protective measures for this alternative are described in the program EA (USDA, APHIS, 2002).

The protective measures include mitigations for pesticide applications and notification procedures. The potential environmental consequences from applications of chlorpyrifos and permethrin are described in detail in the program chemicals risk assessment (USDA, APHIS, 2008).

B. Augmentation of Chemical Control Methods

This is the preferred alternative for this program, in that it provides additional methods to achieve the eradication of pink bollworm. The applications are comparable to the aerial and ground applications already analyzed for chlorpyrifos and permethrin in the program EA, but involve the use of other formulations of synthetic pyrethroids (cyhalothrin, cypermethrin, and esfenvalerate). The program's use of these applications is limited to those circumstances where one or several cotton fields in a given location require an application to supplement the other control methods used. In such instances, the variety of synthetic pyrethroids described here may be rotated in order to maintain the effectiveness of each treatment. This approach utilizes proven resistance management strategies, allowing the program to move toward successful completion of eradication.

The environmental consequences of this alternative focus on the potential impacts from the proposed new pesticide applications as compared to the impacts from the present pesticide use patterns. In particular, the potential impacts from these new synthetic pyrethroids are best compared with the impacts from the present ground and aerial applications of permethrin. The potential environmental impacts from the chemical applications are described in detail in the program chemicals risk assessment (USDA, APHIS, 2008), but the findings from the risk assessment are summarized within this EA. Additional program protective measures are described in the consequences section.

III. Potential Environmental Consequences

The potential environmental consequences of each of the alternatives (no action and augmentation of program chemical control methods) are presented in this section. The primary difference in the alternatives relates to their use of program pesticide treatments, so this section focuses on the comparison of consequences from the different applications. Much of the environmental consequences section of the program EA (USDA, APHIS, 2002) is not repeated here, but the findings are summarized for each topic. Consequences are addressed for each alternative under the following topics: (1) potential effects on human health, (2) potential effects on wildlife (including endangered and threatened species) from program activities and treatments, and (3) potential effects on environmental quality. Site-specific characteristics of the program area are considered with respect to their potential to alter or influence the anticipated effects on human health, wildlife, or environmental quality. Additional program protective measures are also described in this section.

The intent of the eradication program is to eliminate the pest risk and any subsequent need for pest control such that potential damage by pink bollworm no longer poses threats to the cotton crop. Although the eradication from the cotton belt of the United States and northern Mexico does not ensure exclusion of pink bollworm in the future, it does eliminate the natural spread of the moth that continues to result from the extant population in the United States and northern Mexico. No significant cumulative impacts are expected as a consequence of the proposed program or its component treatment methods because the eradication and subsequent exclusion measures are expected to preclude any need for further actions due to the lack of future introductions and lack of ability to spread within the United States Cotton Belt.

A. Human Health

The principal concerns for human health are related to the program use of chemical pesticides. Three major factors influence the human health risk associated with pesticide use: fate of the pesticides in the environment, their toxicity to humans, and their exposure to humans. Each of the program pesticides is known to be toxic to humans. Exposure to program pesticides can vary, depending upon the pesticide and the use pattern. Potential exposure is more likely to program personnel and pesticide applicators than to the general public because applications are only applied to commercial cotton fields. The human health analyses and data for the program EA (USDA, APHIS, 2002) and the chemicals risk assessment (USDA, APHIS, 2008) are summarized and incorporated by reference into this section. Table III-1 describes the proposed use patterns of the new pesticides being considered.

The chemicals risk assessment (USDA, APHIS, 2008) reviews information about each pesticide to identify the potential toxic effects (hazard identification), determine exposure levels associated with these effects (dose-response assessment), estimate levels to which individuals may be exposed (exposure assessment), and discuss the consequences of such exposure (risk characterization). Each phase of the assessment is accompanied by

uncertainties imposed by either limited data or limitations in the ability to extrapolate the available data to exposure scenarios of concern to the risk assessment. The risk comparison places the quantitative assessments and associated uncertainties into perspective with the problems posed by pink bollworm and the available control methods for dealing with this insect pest.

Table III-1. Proposed New Program Use Patterns for Insecticides

Insecticide	Application Rate (lb a.i./acre)	Application Method for Cotton Crop	Active Ingredient
Cyhalothrin	0.03	Aerial and Ground	[1-alpha (S), 3 alpha (Z)]-($\pm$)- cyano-(3-phenoxyphenyl) methyl 3(2-chloro-3,3,3-trifluoro-1-propenyl)-2,3-dimethyl-cyclopropane carboxylate
Cypermethrin	0.1	Aerial and Ground	alpha-cyano-m-phenoxybenzyl 3- (2,2-dichlorovinyl) -2,2-dimethyl cyclopropane carboxylate
Esfenvalerate	0.05	Aerial and Ground	(s)-cyano (3-phenoxyphenyl) methyl (S)-4-chloro-alpha-(1-methylethyl) benzene acetate

Each of the additional pesticides proposed for use in the preferred alternative are synthetic pyrethroids. Their mode of toxic action occurs through effects on the sodium channel to stimulate nerves to produce repetitive discharges. Muscle contractions are sustained until a block of the contraction occurs. Nerve paralysis occurs at high levels of exposure. The symptoms of pyrethroid toxicity in mammals are diarrhea, deepened respiration, tremors, and convulsions. Pyrethroid insecticides are most toxic at low temperatures (Sparks et al., 1983). The primary route of potential exposure to synthetic pyrethroids in the program is dermal, but some exposure though inhalation is also possible, particularly for applicators and field workers.

The risk assessment considers human health in both quantitative and qualitative aspects. The quantitative risk assessments consider potential exposure scenarios (typical and extreme) for each program chemical application. The qualitative risk assessment takes into account important factors that influence exposure and risk, but are outside the direct control of the program or cannot be quantitatively related to exposure. For example, risk to human health from applications of pesticide on fields adjacent to cotton fields treated through program activities would be analyzed subjectively. This qualitative approach is taken because the chemical, rate, and method of application for treatment of these adjacent fields are not known and cannot be predicted with certainty.

1. Quantitative Assessment

Human health is quantified by comparing predicted exposure to toxicity reference levels based upon intrinsic hazards as described in detail in the program risk assessment (USDA, APHIS, 2008). Those toxicity reference values were applied to expected exposures to quantify risk. The general classification of the acute human oral toxicities is slight for cypermethrin and moderate for cyhalothrin and esfenvalerate. Refer to the discussion in the risk assessment for a more thorough review of toxicities and hazards of the program pesticides. The scenarios analyzed quantitatively in the risk assessment reflect likely conditions in the proposed program. The scenarios include dermal, inhalation, and dietary exposures to the public, as well as occupational exposures. The quantitative analyses are prepared for both typical and extreme exposure to workers and the general public.

The margins of safety are determined by dividing the lowest toxicity reference level of the pesticide by the exposure level determined in the scenario. Detailed descriptions of the potential risk to program workers and the general public are presented in the risk assessment. Although exposures and associated risks in several of the worker exposure scenarios may appear high, these scenarios do not include use of required safety precautions or use of protective clothing. Comprehensive training of all workers and proper use of protective clothing ensures that the margins of safety are adequate for all likely routes of exposure. The margins of safety to the general public indicate minimal risk and adequate safety against adverse effects. The toxicity reference levels used in the risk assessment are presented in table III–2.

Table III–2. Acute and Chronic Toxicity Reference Levels Used

Pesticide	Acute oral LD_{50} in rats (mg/kg)	Systemic NOEL* (mg/kg/day)		Reproductive/ developmental NOEL (mg/kg/day)
		Human	Rat	
Chlorpyrifos	97	0.03	0.01	2.5
Permethrin	430	5.0	5.0	50
Cyhalothrin	56	0.5	0.5	10
Cypermethrin	247	7.5	7.5	12.5
Esfenvalerate	1,000	2.5	2.5	12.5

* No Observed Effect Level

The risk determined for exposed individuals depends largely upon the exposure scenario. This information is summarized by chemical in table III–3. Each scenario assumes no special efforts are taken to prevent exposure and the estimated risk is very conservative. Required adherence to program protective measures by workers and application of mitigation measures to prevent exposure of the general public ensure that these potential risks are minimized. See section III.D. for further details about protective measures.

Table III–3A. Summary of Highest Public and Worker Risks* from Control Operations with Cyhalothrin

Exposure Scenario	Typical	Extreme
Public:		
Dermal and inhalation	E	E
Dietary	E	E
Workers:		
Pilot	E	E
Mixer/loader	E	E
Observer	E	C
Monitoring Team	E	E
Ground Applicator	C	A
Accidents:		
Worker		A
Public		E

*Where there is more than one risk category for an exposure scenario, only the highest risk category is included.

Table III–3B. Summary of Highest Public and Worker Risks* from Control Operations with Cypermethrin

Exposure Scenario	Typical	Extreme
Public:		
Dermal and inhalation	E	E
Dietary	E	B
Workers:		
Pilot	E	E
Mixer/loader	E	E
Observer	E	E
Monitoring Team	E	E
Ground Applicator	E	B
Accidents:		
Worker		A
Public		E

*Where there is more than one risk category for an exposure scenario, only the highest risk category is included.

Table III–3C. Summary of Highest Public and Worker Risks* from Control Operations with Esfenvalerate

Exposure Scenario	Typical	Extreme
Public:		
Dermal and inhalation	E	E
Dietary	E	C
Workers:		
Pilot	E	E
Mixer/loader	E	E
Observer	E	D
Monitoring Team	E	E
Ground Applicator	E	C
Accidents:		
Worker		A
Public		E

*Where there is more than one risk category for an exposure scenario, only the highest risk category is included.

Risks are categorized as follows:
A = Substantial risk – margin of safety is less than 1.
B = Moderate to substantial risk – margin of safety is between 1 and 10.
C = Slight to moderate risk – margin of safety is between 10 and 50.
D = Slight risk – margin of safety is between 50 and 100.
E = Negligible risk – margin of safety is greater than 100.

Typical exposures for all three proposed pesticide applications pose negligible risks for the dietary, dermal and inhalation exposure scenarios of the public. Most typical exposure scenarios for workers pose negligible risks except the scenario for ground applicators applying cyhalothrin. As was indicated previously, these scenarios assume no adherence to program protective measures and mitigation measures to minimize exposure. Adherence to those requirements (see section III.D) precludes adverse risk to ground applicators.

Most extreme exposure scenarios also pose negligible risks. The other extreme exposure scenarios for the public are mitigated by protective measures to keep drift from water bodies and restriction of applications to cotton at a season of the year when hunting deer and other wild animals does not normally occur. The elevated risks to ground applicators and personnel from accidents reinforce the importance of workers adhering to required safety procedures and wearing proper protective gear when pesticide applications are made.

2. Qualitative Assessment

Qualitative risk assessment is used to analyze risks that cannot be quantified easily, especially those involving incomplete exposure information or unclear relationships between dose and response. Qualitative assessments either relate directly to the formulated pesticides (including impurities and degradation products) used in program treatments or to treatments of adjacent fields with pesticides by private growers as they relate to program pesticide applications. Discussions of qualitative risks are presented in the pink bollworm chemicals risk assessment (USDA, APHIS, 2008). This section focuses on the effects of program pesticide formulations' impurities and degradation products, the anticipated cumulative and synergistic effect issues, and the potential effects on sensitive groups.

The acute oral toxicities of each of the proposed chemicals in the preferred alternative are lower than that of chlorpyrifos (the primary insecticide used in the present program), so the use of these pesticides poses less direct toxicity to humans and mammals. Cyhalothrin is a skin irritant and a mild sensitizer, but cypermethrin and esfenvalerate are not. No evidence of mutagenic, teratogenic or carcinogenic effects have been noted in test animals or in vitro studies. The mechanism of toxic action for these three proposed chemicals (cyhalothrin, cypermethrin, and esfenvalerate) is the same as permethrin. The effects result from the blocking of muscle contractions from overstimulation by repetitive nerve impulses from transmissions at the sodium channels. Adverse effects such as nerve paralysis occur only at exposures to synthetic pyrethroids higher than those anticipated from program applications.

Impurities and degradation products may occur in formulated products, result from improper storage, or result from use of chemicals after the expiration date for shelf life. Program quality control guidelines require proper storage conditions and sampling of the product to ensure that impurities and degradation products pose no significant hazards to workers or the general public. None of the metabolites or degradation products of the proposed chemicals to be added to the program are known to pose new or greater risks than the actual pesticides. As was true with the metabolites and degradation products of chlorpyrifos and permethrin, these compounds are also of lower acute toxicity.

Cumulative and synergistic effects are those adverse effects that result from exposures to more than one chemical or exposure to a given chemical more than once with a frequency that results in greater adverse effects than a single exposure. The potential for multiple exposures depends on site-specific conditions and persistence of the chemical. Cumulative effects are those which result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions. Synergistic effects are those adverse effects from exposure to more than one compound that result in greater overall potential risk than the sum of the risks from individual exposures.

Simultaneous exposure to pesticide residues from program treatment of cotton fields and from grower treatment of other crops in adjacent fields is possible, but highly unlikely. To avoid conflicts in scheduling and space requirements, growers are informed of the time of program treatments and are likely to apply at other times. Appropriate communication with local growers and residents, use of treatment flags, and adherence to required re-entry periods prevent these exposures and effects. See section III.D. for details.

Treatment of adjacent fields by growers 1 day or more before or after program treatment is more likely. Exposure to more than one chemical under these circumstances depends upon the rate of degradation of the pesticides used and the location relative to treatment areas. The persistence of the residues of these chemicals is similar to that of permethrin, but shorter than that of chlorpyrifos. Any potential adverse cumulative effects from program pesticides is limited by their persistence in the field.

Cumulative effects are most likely for multiple exposure to the compounds of the same chemical class. The three new insecticides being proposed are in the same chemical class as permethrin, so any permethrin residues persisting from earlier applications could pose greater cumulative effects with the residues of cyhalothrin, cypermethrin, and esfenvalerate. The use of these compounds is limited to those situations where pink bollworm populations remain elevated so this occurrence is only expected for a limited number of cotton fields where previous efforts were not effective at decreasing pest populations.

Synergistic effects have been shown for exposure to organophosphates (such as chlorpyrifos) and synthetic pyrethroids (such as permethrin, cyhalothrin, cypermethrin, and esfenvalerate) in laboratory and field tests (Keil and Parrella, 1990; Horowitz et al., 1987). Synergistic effects from the use of these compounds are considerably less likely than other pesticide applications because adherence to program safety procedures and re-entry periods preclude most exposures (see section III.D. for details).

For each chemical control agent, an attempt has been made to identify groups at special risk due to location, disease state, or other biological variation. Safety procedures ensure that workers are not exposed to levels of these pesticides high enough to increase risk. The group at the greatest risk are those individuals who live next to cotton fields. The program makes sure that these persons are notified of the times of pesticide application and instructed about safe re-entry times for fields. Infants may be more sensitive than adults to the effects of exposure to program pesticides. Individuals on certain medicines such as pentobarbitone (Uppal et al., 1982) may be at increased risk. Some individuals may be less tolerant of exposure to these compounds because of a diminished ability to recover from the effects induced by exposure to these chemicals. Proper notification and instruction about re-entry precautions reduces potential risks (see section III.D. for details).

Individuals who have multiple chemical sensitivity (MCS) may be extremely sensitive to even very low levels of exposure to a variety of chemical agents. Because of the highly variable nature of this condition, it is not possible to quantitatively or qualitatively assess the effects to such people. The percentage of MCS in the general population is unknown, partly because there is no acceptance of a single set of criteria for the diagnosis of MCS. Studies of the incidence of MCS have indicated that only a small percentage of the general population have this level of sensitivity to chemical exposure (Calabrese, 1991). Because the program would tend to reduce pesticide use on cotton in the area, any incidence of MCS reaction to pesticide use on cotton would be expected to decrease.

3. Effects Comparison of Alternatives on Human Health

The alternatives were compared with respect to their potential to affect human health. In general, a well-coordinated eradication program using IPM technologies incorporating the additional chemicals would result in the least use of chemical pesticides overall in the eradication program and would decrease the need for grower use of pesticides in the future. This would pose the least potential for adverse effects to human health. The other alternative would not be expected to eradicate pink bollworm as readily or as effectively as the preferred alternative. The no action alternative could prolong the program and would result in broader and more widespread use of pesticides to reach the goal.

Some executive orders, such as Executive Order 13045, Protection of Children from Environmental Health Risks and Safety Risks, and Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, as well as departmental or agency directives call for special environmental reviews in certain circumstances. No disproportionate adverse effects are expected from the proposed action to children, minorities or low-income populations. No circumstances that would trigger the need for special environmental reviews are invoked in implementation of the preferred alternative.

B. Nontarget Species

Risk assessments were conducted to evaluate the potential effects of program pesticides on nontarget species (domestic animals, wildlife, and plants). The chemicals risk assessment (USDA, APHIS, 2008) integrates hazard assessment and exposure assessment to arrive at a characterization of risk.

The criteria that EPA (U.S.EPA, OPP, 1986b) uses in their ecological risk assessment of nontarget species were applied to determine the risks to different representative wildlife species for each of the insecticides. The risk is determined by comparing exposure to each compound to the inherent toxicity (hazard) of the active ingredient.

Cyhalothrin, cypermethrin, and esfenvalerate are slightly toxic to birds, reptiles, and amphibians. All are very highly toxic to fish and aquatic invertebrates. They are extremely toxic to honey bees and terrestrial insects (EPA, OPP, 1988, 1989c).

1. Terrestrial Nontarget Species

Risk to terrestrial wildlife is assessed by comparing the exposure to a hazard index. The acute median lethal dose or LD_{50}, is the standard value used for comparison to exposure of terrestrial wildlife species to determine the risk. The LD_{50} is the dose in laboratory tests at which there is mortality to one-half of the exposed population. For nonendangered terrestrial wildlife species, the assessment of risk from chemical exposure in our chemical risk assessment is determined according to the following scale (EPA, OPP, 1986):

A = High risk – dose is greater than or equal to LD_{50} for terrestrial species.
B = Moderate risk – dose is greater than or equal to 1/5 LD_{50} but is less than LD_{50} for terrestrial species.
C = Low risk – dose is less than 1/5 LD_{50} for terrestrial species.

The exposure of terrestrial wildlife depends upon many factors such as habits, physiology, and niche. The species receiving the highest exposure in the scenarios for each chemical was the deer mouse. This species has the potential for considerable exposure through diet, dermal exposure, and respiration. This species is, however, usually not the most sensitive to the adverse effects of these pesticides.

The risks to terrestrial wildlife species are presented in Table III-4. The risks that usually would be expected from program applications are those for the typical scenarios. Based upon this, the risks to terrestrial wildlife species are generally low for program use of synthetic pyrethroids except to insects from permethrin and cypermethrin. The moderate risk to insects from these pesticides is expected. Likewise, most species are at low risk from the extreme exposure scenarios, but all pesticides pose elevated levels of risk to terrestrial insects from these applications. The program does apply mitigations to minimize exposure of some desirable insect species such as honey bees to protect them from risks and adverse impacts.

Although program applications of pesticides pose no direct risk to plant species, there may be some indirect risk to plants associated with adverse effects to pollinators. Pollinators include many species of insects, such as bees, ants, wasps, as well as bats and/or birds for certain plants. It is unlikely that the application of the program pesticides would eliminate all pollination, but pesticides could reduce the number of potential pollinators for a particular plant species. Honey bees and alkali bees are important as regional crop pollinators and honey producers. As a precaution, prior to treatments, program personnel notify registered apiarists in or near treatment areas of the date and approximate time of expected insecticide applications.

Table III–4A. Summary of Highest Risks to Nontarget Terrestrial Species from Cyhalothrin

Species	Exposure Scenario	
	Typical	Extreme
Birds	C	C
Mammals	C	C
Reptiles	C	C
Amphibians	C	C
Insects	C	B
Domestic animals	C	C

Table III–4B. Summary of Highest Risks to Nontarget Terrestrial Species from Cypermethrin

Species	Exposure Scenario	
	Typical	Extreme
Birds	C	C
Mammals	C	C
Reptiles	C	C
Amphibians	C	C
Insects	B	A
Domestic animals	C	C

Table III–4C. Summary of Highest Risks to Nontarget Terrestrial Species from Esfenvalerate

Species	Exposure Scenario	
	Typical	Extreme
Birds	C	C
Mammals	C	C
Reptiles	C	C
Amphibians	C	C
Insects	C	B
Domestic animals	C	C

2. Aquatic Nontarget Species

Risk to aquatic wildlife is assessed by comparing the expected environmental concentration (EEC) in water to a hazard index. The acute median lethal concentration or LC_{50} is the standard value used for comparison to the expected environmental concentration in the water for aquatic wildlife species to determine their risk. The LC_{50} is the concentration in water in laboratory tests at which there is mortality to one-half of the exposed population. For nonendangered aquatic wildlife species, the assessment of risk from chemical exposure is determined according to the following scale (EPA, OPP, 1986):

A = High risk – EEC is greater than or equal to ½ LC_{50} for aquatic species.
B = Moderate risk – EEC is greater than or equal to 1/10 LC_{50} but less than 1/2 LC_{50} for aquatic species.
C = Low risk – EEC is less than 1/10 LC_{50} for aquatic species.

The exposure of aquatic wildife to pesticides depends upon many factors such as habits, physiology, and niche. The primary factor for most species is the concentration in the water. Use of the EEC assumes that the concentration is the same throughout the water, independent of depth, organic matter, and the nature of bottom sediments. The tendency of pesticides to settle, degrade, and adsord to surfaces may affect the actual exposure considerably. By assuming even mixing of the pesticide in the water, the actual exposure to species may be either overestimated or underestimated. This approach is generally conservative and usually overestimates exposure for these species.

The risks to aquatic species are presented in table III-5 for ponds and in table II-6 for creeks. The risks that would usually be expected from program applications would be those for the typical scenarios. Based upon this, the risks to wildlife species in ponds are generally high for all program applications. This indicates that mitigation measures to prevent drift or runoff into standing bodies of water are important to protect fish and other nontarget aquatic species. See section III.D. about program protective measures.

Residues of pesticides entering flowing water (i.e., creeks) dissipate more readily than in ponds due to constant movement of water from upstream that lowers the potential water concentration. This effect diminishes the risk in the exposure scenarios for creeks relative to ponds. Despite this tendency of flowing water to lower exposure and potential risk, the risk from program applications of cypermethrin remains moderate to aquatic invertebrates. The other proposed chemicals (cyhalothrin and esfenvalerate) pose low risks to all species in creeks. These risks are lower than those posed by the present use of permethrin and chlorpyrifos in the program. Mitigation measures are required and should be employed to prevent drift and runoff from entering flowing water such as creeks as rivers.

Table III–5A. Summary of Highest Risks to Aquatic Species in Ponds for Cyhalothrin

Species	Exposure Scenario	
	Typical	Extreme
Fish	A	A
Aquatic Invertebrates	A	A
Amphibians	A	A

Table III–5B. Summary of Highest Risks to Aquatic Species in Ponds for Cypermethrin

Species	Exposure Scenario	
	Typical	Extreme
Fish	A	A
Aquatic Invertebrates	A	A
Amphibians	A	A

Table III–5C. Summary of Highest Risks to Aquatic Species in Ponds for Esfenvalerate

Species	Exposure Scenario	
	Typical	Extreme
Fish	A	A
Aquatic Invertebrates	A	A
Amphibians	A	A

Table III–6A. Summary of Highest Risks to Aquatic Species in Creeks for Cyhalothrin

Species	Exposure Scenario	
	Typical	Extreme
Fish	C	C
Aquatic Invertebrates	C	C
Amphibians	C	C

Table III–6B. Summary of Highest Risks to Aquatic Species in Creeks for Cypermethrin

Species	Exposure Scenario	
	Typical	Extreme
Fish	C	C
Aquatic Invertebrates	B	B
Amphibians	C	C

Table III–6C. Summary of Highest Risks to Aquatic Species in Creeks for Esfenvalerate

Species	Exposure Scenario	
	Typical	Extreme
Fish	C	C
Aquatic Invertebrates	C	C
Amphibians	C	C

3. Endangered and Threatened Species

Section 7 of the Endangered Species Act (ESA) and its implementing regulations require Federal agencies to consult with the U.S. Fish and Wildlife Service (FWS) and/or the National Marine Fisheries Service (NMFS) to ensure that their actions are not likely to jeopardize the continued existence of endangered or threatened species or result in the destruction or adverse modification of critical habitat. APHIS has considered the potential effects on endangered and threatened species and their habitats.

Since 2005, APHIS has conducted ESA section 7 consultation with FWS for the National Pink Bollworm Eradication Program in Arizona, New Mexico, and Texas. APHIS prepared and submitted a biological assessment to FWS that analyzed the effects of program activities occurring in certain counties in Arizona, New Mexico, and Texas,. Activities including mapping, trapping, cultural control, sterile insect technique, use of Bt cotton, and pesticides were considered. APHIS determined that none of these activities except pesticides would have an effect on threatened or endangered species or their habitats. Measures to protect listed species from exposure to program pesticides were put in place and these measures are used by the program. Each year since 2005, APHIS has reinitiated consultation for Arizona, New Mexico, and Texas to consider newly-listed or proposed species and newly-proposed or designated critical habitat in the program area, or changes in program activities, such as the use of new pesticides and new treatment areas. Section 7 consultation with FWS in California is currently in process and a biological assessment is being prepared to evaluate the effects of chlorpyrifos, cypermethrin, and esfenvalerate in the treatment areas in California. These pesticides will not be used in California until consultation with FWS has been completed.

APHIS will continue to consider effects of program actions on threatened and endangered species and their habitats in the program area and will reinitiate section 7 consultation with FWS and NMFS as necessary.

C. Environmental Quality

The chemical pesticides proposed for use in the program have potential to affect the physical environment (air, land, and water). Potential concerns over the effects of program pesticides on the physical environment relate to air pollution (from off-site drift), soil pollution (from drift or misdirected applications), and water pollution (from runoff, drift, and misdirected applications).

In general, program pesticides are not expected to affect air quality in the general (overall) sense. Cyhalothrin, cypermethrin, and esfenvalerate have low volatility, so any residues remaining in the air after a program application decrease readily.

Analysis of the environmental fate of each pesticide used in the Southwest Pink Bollworm Eradication Program under various meteorological conditions was assessed through the use of the Agricultural Dispersal (AGDISP) model for determining potential for drift and the Groundwater Loading Effects of Agricultural Management Systems (GLEAMS) model for determining potential for insecticide runoff in water and eroded soil following a 2-year storm (USDA, APHIS, 2008). The maximum drift determined by AGDISP occurred for all three proposed pesticides at a distance of 50 feet under calm conditions (crosswind speed of 1 mph). The maximum measurable drift under extreme conditions (crosswind of 10 mph) was determined to be 100 feet for cypermethrin and esfenvalerate. Cyhalothrin was not projected to drift further than 50 feet. Deposition at 25 feet under extreme conditions was determined to be 1.9 mg a.i./m^3 for cyhalothrin, 6.4 mg a.i./m^3 for cypermethrin, and 3.2 mg a.i./m^3 for esfenvalerate. Data from this modeling is applied to calculations of potential exposure of humans and nontarget species.

The potential for soil contamination is also expected to be minimal. Applications are rarely misdirected because of sophisticated guidance and control systems that the program uses (satellite tracking, global positioning systems, and onboard computer systems that track an aircraft's path and spray operations). All three synthetic pyrethroids are relatively immobile in soil and degrade relatively rapidly under natural conditions, so potential for these chemicals to leach to groundwater is very unlikely. Esfenvalerate is the most persistent of the three pesticides on soil surfaces with a half-life of 65 days to 8 months (Katagi, 1991), but photodegradation in cotton fields is likely to reduce its concentrations.

There is some potential for runoff of program pesticides if rainfall occurs shortly after applications. However, operating procedures and additional protective measures serve to minimize the effects of program chemicals on water bodies, nontarget aquatic organisms, and those in the public who could drink from or consume fish from those locations. The three synthetic pyrethroids have very low water solubility, but can persist on aquatic sediments. The predicted insecticide losses from GLEAMS simulation of a 2-year storm in runoff water are 0.0084 mg/L for cyhalothrin, 0.0028 mg/L got cypermethrin, and 0.0014 mg/L for esfenvalerate. The predicted insecticide losses from GLEAMS simulation of a 2-year storm in eroded soil are 0.0748 µg/g for cyhalothrin, 0.2492 µg/g for cypermethrin, and 0.1242µg/g for esfenvalerate. Program applications are expected to pose less risk than that caused by existing pest control practices due to the program mitigation measures. See section III.D. for information about these measures.

None of these program pesticides are expected to persist in exposed plants or animals. Although residues of these synthetic pyrethroids can be taken up by plants from the soil, degradation in plants occurs readily. Residues taken up by fish may bioaccumulate up to 400-fold, but the half-life for depuration of their tissues takes only 33 days when the source of exposure is removed (Katagi, 1991).

The alternatives were compared with respect to their potential to affect environmental quality. Risk to environmental quality is considered minimal and lower for the synthetic pyrethroids than for chlorpyrifos. A well- coordinated eradication program using IPM technologies results in the least use of chemical pesticides overall, with minimal adverse impact on environmental quality. The no action alternative could prolong the eradication program and result in broader and more widespread use of pesticides than the preferred alternative.

D. Additonal Program Protective Measures

Comprehensive routine operational procedures and mitigation measures that have been followed in previous cotton control programs (USDA, APHIS, 1991) will be adhered to in this program. The following additional protective measures, recommended for the Pink Bollworm Eradication Program, will be used to further reduce the potential for adverse environmental effects from program actions.

1. Pesticide Applications

a. Program personnel overseeing applications of pesticides are required to wear protective clothing or remain inside a closed vehicle with recirculating air, depending on the circumstances of the application.

b. Unprotected workers will be advised of the respective re-entry periods following treatment.

c. Program personnel shall immediately cease spraying operations if members of the public are observed within 100 feet of a cotton field being treated.

d. Aerial applications will not be made to sensitive areas (residences, public buildings, water bodies, hospitals, primary and secondary schools, day care centers, in-patient clinics, nursing homes, parks, churches); program treatments will be applied only to cotton fields.

e. Aerial applications will be made at a height of 5-12 feet above the cotton canopy, unless precluded by obstructions.

f. Program personnel will familiarize aerial applicators with applicable operational procedures, mitigation measures, and protective measures.

g. Before initiating operations, APHIS will obtain concurrence from the U.S. Department of Interior’s Fish and Wildlife Service on protection measures that are required for endangered and threatened species, or their critical habitats.

h. Program personnel will be present during all treatments near sensitive areas; they will use dye cards along field edges to detect off-site drift of pesticides.

i. The program will report any incident of pesticide poisoning to the local Department of Health; information about the validity and probably cause will be used to develop additional protective measures, as necessary.

1. Pesticide Applications

a. Program personnel will provide advance written or telephonic notification of the approximate times and dates of treatments to area residents who reside within 3 miles of treatments and who formally request (providing their name, address, and telephone number) special notification.

b. Program personnel will publish public notices of the availability of the environmental assessment (EA) for this program in local newspapers; copies of the EA will be provided to local libraries.

c. Growers participating in the program will be notified of treatment dates so that they may provide timely and appropriate notice of treatments and protective measures to persons in their employ or residing on properties who could be exposed to chemical pesticides.

d. Residents who are registered with the local state department of agriculture as having multiple chemical sensitivity will be notified in writing or by telephone of the time of any program treatments to be made within 3 miles of their residence.

e. Before beginning treatment with pesticides, program personnel shall notify all registered apiarists in or near the treatment area of the date and the approximate time of treatment.

IV. Listing of Agencies and Persons Consulted

U.S. Department of Agriculture
Animal and Plant Health Inspection Service
Plant Protection and Quarantine
Emergency and Domestic Programs
4700 River Road, Unit 138
Riverdale, MD 20737–1236

U.S. Department of Agriculture
Animal and Plant Health Inspection Service
Policy and Program Development
Environmental Services
4700 River Road, Unit 149
Riverdale, Maryland 20737–1238

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Finding of No Significant Impact
for
Southwest Pink Bollworm Eradication Program
Supplement to the Environmental Assessment,
April 2008

The U.S. Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS) has prepared a supplemental environmental assessment (EA) that analyzes alternatives for the Southwest Pink Bollworm Eradication Program. The EA, incorporated by reference in this document, is available from:

USDA, APHIS, PPQ
Cotton Pest Programs
4700 River Road, Unit 138
Riverdale, MD 20737–1236

The EA for this program analyzed alternatives of no action and augmentation of program methods of chemical control. Each of these alternatives was determined to have potential environmental consequences. APHIS selected the augmentation of program methods of chemical control for the proposed program because of its flexibility and capability to achieve eradication in a way that also reduces the magnitude of those potential environmental consequences.

APHIS has determined that this program is not likely to adversely affect federally-listed endangered and threatened species, species proposed for listing, or designated or proposed critical habitat in Arizona, New Mexico, and Texas. APHIS has conducted Section 7 consultation with the U.S. Fish and Wildlife Service and has received concurrence with this determination. In California, Section 7 consultation is currently underway and no program pesticides will be used in treatment areas in that State until the consultation process is complete.

I find that implementation of the proposed program will not significantly impact the quality of the human environment. I have considered and based my finding of no significant impact on the quantitative and qualitative risk assessment of the proposed pesticides and on my review of the program's operational characteristics. In addition, I find that the environmental process undertaken for this program is entirely consistent with the principles of environmental justice, as expressed in Executive Order 12898, and the protection of children, as expressed in Executive Order 13045. Lastly, because I have not found evidence of significant environmental impact associated with this proposed program, I further find that an environmental impact statement does not need to be prepared and that the program may proceed.

__________________________________ ____________________

William Grefenstette Date
National Coordinator, Cotton Pest Programs
Animal and Plant Health Inspection Service
Riverdale, Maryland