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Southwest Pink Bollworm Eradication Program

Environmental Assessment
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I. Need for the Proposed Action

The boll weevil, *Anthonomus grandis* Boheman, and the pink bollworm, *Pectinophora gossypiella* Saunders, are probably the most important pests of cotton in the United States. These serious economic pests are the subject of various control programs by federal, state, local, and commercial organizations in various parts of the U.S. Cotton Belt. A pink bollworm cooperative eradication program has been implemented in the El Paso/Trans Pecos region of Texas.

The Animal and Plant Health Inspection Service (APHIS), in response to the Southwest's cotton producers' agricultural losses and requests for assistance, is proposing with its cooperators to expand its pink bollworm program in the southwestern United States and northern Mexico. Over a protracted time period between 2002 and 2006, the proposed Southwest Pink Bollworm Eradication Program will include cotton-growing areas of the El Paso/Trans Pecos region of western Texas, New Mexico, southern Arizona, southern California, and northern Mexico (State of Chihuahua and the Mexicali Valley).

APHIS' authority for cooperation in this program is based upon the Plant Protection Act, (*Public Law 106-224, 114 Stat. 438-455)*, which authorizes the Secretary of Agriculture to carry out operations to eradicate insect pests and to take measures to prevent the dissemination of a plant pest that is new to or not known to be widely prevalent or distributed within and throughout the United States. This environmental assessment (EA) has been done 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 Actions."

II. Alternatives

Three alternatives were considered for pink bollworm control in the southwest United States. These were: (1) no action (no change in the existing program), (2) pink bollworm suppression, and (3) pink bollworm eradication (the proposed alternative).

A. No Action

No action would be characterized by no change in the cooperative program that APHIS conducts now to contain the pink bollworm in cotton growing regions of the Southwest. There are cooperative (federal, state, local, and grower) eradication efforts currently underway for pink bollworm in the El Paso/Trans Pecos region of Texas. Under this alternative, APHIS would not participate in expansion of the program into other southwest states or northern Mexico. It is likely that any expansion efforts by other organizations or government entities would be diminished or slowed because of the lack of federal support and/or resources. No action would also result in the continuation of current control practices implemented by individual growers, which rely heavily on the use of agricultural chemicals. The inability to achieve area-wide eradication would result in prolonged use of agricultural chemicals, and correspondingly greater potential for adverse environmental impact than the proposed action.

B. Pink Bollworm Suppression

A pink bollworm suppression program could be designed which would have as its objective the reduction of infestation levels of pink bollworm throughout cotton production areas of the Southwest. Such a program could use any combination of methods, including chemical control, cultural control, sterile releases, transgenic cotton, regulatory control, and others.

Although suppression of pink bollworm could have potential benefits, it was considered briefly by APHIS and dismissed from detailed consideration because it does not meet the desired objective: eradication, not suppression of pink bollworm populations. Further, it would be unsupported by state agriculture departments, grower groups, and the Government of Mexico, which all have the objective of eradicating this pest. Effectively, the determination of these other groups to implement eradication strategies limits APHIS' choice among alternatives to either no action or the proposed alternative, cooperative eradication.

C. Pink Bollworm Eradication (Southwest Pink Bollworm Eradication Program)

The proposed cooperative eradication program is characterized by APHIS' participation in an integrated pink bollworm eradication program. This allows for an economy of effort and the reduction of potential environmental impacts through the coordination and minimization of chemical applications.

Operational aspects of pink bollworm control would 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 pink bollworm would include 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 application of chlorpyrifos).

In Mexico, in the State of Chihuahua, the proposed program will also involve the elimination of a few localized boll weevil infestations. For that associated boll weevil control, the procedures and materials will be identical to those used in the Texas and Oklahoma Cooperative Boll Weevil Eradication Program, which was analyzed in an environmental assessment in April 1998. Boll weevil trapping in recent years indicates that infestations in Chihuahua will be few, with low-level populations that can be eliminated easily.

The proposed program has quantifiable potential environmental consequences, which are discussed in detail in the next section of this environmental assessment.

III. Environmental Consequences

The environmental impacts that may result from implementation of the proposed action and/or its alternatives are considered in this section. Because the principal environmental concern over this proposed program relates to its use of chemical pesticides, this EA, therefore, focuses on the potential effects of program chemical pesticides. The EA uses both quantitative methods (especially to determine risks associated with the use of program chemicals) and qualitative methods to predict risks.

A. No Action

The no action alternative is characterized by no substantive APHIS cooperation with states other than Texas (El Paso/Trans Pecos Region) and grower groups in their effort to eradicate pink bollworm. This alternative does not eliminate the ability of APHIS to review protocol, provide recommendations, and supply technical expertise to assist these areas. However, APHIS would not be involved in providing funds, management or personnel to eradicate, suppress or control any pink bollworm infestations in these other states under this alternative. Any control efforts would be the responsibility of the cooperating state or local governments, growers or grower groups, individual citizens, and the Government of Mexico. There is no way to predict whether the cooperative effort could acquire adequate resources and establish sufficient jurisdiction to take the action required to eradicate the well established pink bollworm infestations that now exist.

The most probable outcome of the no action alternative would be that established local infestations would remain, particularly in areas where there are host plants other than cotton. This could be expected to cause periodic outbreaks into other cotton-growing areas and might not control the infestation sufficiently to prevent costly damage to the cotton crop.

In the absence of APHIS efforts to assist in the eradication program in these other states, losses and damage to crops would continue to provoke independent control efforts that would probably lack sufficient coordination to eliminate the ongoing threat of crop loss from pink bollworm. The ongoing threat of reinfestation to the El Paso/Trans Pecos area of West Texas would jeopardize any success from the present and ongoing eradication efforts there. Available resources for trapping, sterile insect technique, cultural control, and chemical control would be more limited to the program. Those efforts could result in continually increasing dependence of growers upon chemical pesticides to ensure adequate crop protection. The lack of coordination of effort would be expected to require greater quantities of pesticides, more frequent applications, and often inadequately targeted applications to the cotton crop.

The severity of environmental consequences to human health, nontarget species, and the physical environment would depend upon the site-specific areas treated, the effectiveness of treatments at eliminating pest risks, and the characteristics of the control techniques used. It is likely that most people would be uninformed of the times and areas to be treated. This would not allow them to take any precautions to avoid exposures. Public exposure to various pesticides used in cotton at differing application rates may pose increased risks from cumulative effects or synergistic effects from pesticide interaction. The lack of APHIS assistance would be expected to delay or decrease the effectiveness of the eradication effort which would result in extending the time when the growers would have to treat for pink bollworm. The potential adverse effects of these continuing treatments could be precluded by a cooperative eradication program with good coordination and broad jurisdiction over the entire zone of infestation. In general, the potential environmental consequences from no action would be expected to exceed that from a cooperative eradication program with good coordination, particularly over the long term after successful eradication. The potential environmental consequences of a cooperative suppression program would be expected to be comparable to or less than the no action alternative, depending upon the effectiveness of suppression treatments to control the cotton pests and avoid undesirable exposures or environmental contamination.

B. Pink Bollworm Suppression

A cooperative pink bollworm suppression program could be designed to reduce infestation levels of pink bollworm throughout cotton production areas of the

Southwest. Such a program could use any combination of methods, including chemical control, cultural control, biological control, mechanical control, sterile releases, transgenic cotton, and regulatory control.

APHIS has dismissed this alternative from detailed consideration because it does not meet the desired objective: eradication, not suppression of pink bollworm populations; and would require an ongoing control effort with associated continuing adverse environmental impacts. The lack of support for such a suppression program by state agriculture departments, grower groups, and Mexico make success of this alternative unlikely. Effectively, the determination of these other groups to implement eradication strategies limits APHIS' choice between alternatives to either no action or the proposed alternative, cooperative eradication. The environmental consequences from the selection of a suppression alternative could result in adverse impacts that are comparable to those of the no action alternative, and the continuing adverse impacts from a suppression program would certainly exceed the potential impacts from actions taken under an eradication program.

C. Pink Bollworm Eradication (Southwest Pink Bollworm Eradication Program)

The cooperative nature of the proposed program is designed to ensure good coordination of effort among the concerned parties. This approach provides more effective control actions and less need to duplicate efforts or make unnecessary treatments. It also provides more personnel and resources to focus on the eradication effort and increase the likelihood of more thorough control of the pink bollworm across all infested areas.

1. Overview of Potential Consequences of Program Actions

Although the proposed program places emphasis on the use of several techniques to accomplish the goal of pink bollworm eradication, the environmental consequences for most techniques pose few issues of concern. Activities such as mapping, trapping, and visual inspection are critical to program success, but pose minimal environmental impacts. Detection traps use a lure that is of low toxicity to nontarget species. Mapping and visual inspection involve minimal disturbance of the soil, wildlife, and plants in cotton fields. Cultural control methods (defoliation, stalk destruction, winter irrigation, and burial of crop residues) are often routine practices of the growers to decrease pest risks. This level of disturbance of the fields would be expected to be comparable to the effects under suppression or no action alternatives. Growers routinely plant various strains of transgenic Bt cotton as part of their pest control strategy, so use of this type of cotton does not pose any risks that would not also exist under the other alternatives. The use of sterile insect technique (SIT) to release sterile moths has been determined to pose no impacts to nontarget wildlife other than providing a temporary source of food for some insectivorous species. The use of SIT has also been determined to be compatible with protection of endangered and threatened species of wildlife and their habitats.

The use of mating disruption technique involving applications of pheromones poses minimal adverse impacts when applied independent of other chemical controls. The pheromones are specific to pink bollworm adults and pose no risk to other nontarget species. The pheromones are attractive to adult moths and permethrin may be incorporated in the applied mixture. The environmental consequences of this application are described in detail in the chemical control section. As with any aerial application, there are vehicular emissions from the engines, but the frequency of application and the quantity of emissions pose minimal effects to air quality. The use of PB-Rope or PB-Rope*L dispensers to place pheromones in the cotton fields is a good method for eradication efforts at sensitive sites where potential environmental risks from chemical control applications could be considered unsatisfactory.

The environmental consequences of chemical control applications (aerial or ground applications of chlorpyrifos) as an independent treatment or as an over-spray following mating disruption technique pose greater potential for adverse effects. Likwise, the use of permethrin in aerial applications of pheromone placement has greater potential for adverse impacts. The use of chemical control applications with chlorpyrifos is limited to fields where there is at least 5% of the cotton infested with pink bollworm larvae or where other techniques (mating disruption and use of transgenic Bt cotton) have failed to meet the control thresholds. This more limited use of chlorpyrifos serves to restrict the potential adverse impacts to the sites of application and precludes effects to many cotton fields where other techniques can effectively eliminate pest populations. Site-specific decisions can be made to mitigate potential adverse effects from chlorpyrifos applications. The use of permethrin as part of the pheromone treatment results in pesticide exposures and environment effects that are also important to analyze. The application rate of permethrin from these pheromone treatments is lower than from the other chemical applications and has lower potential for adverse effects than the other chemical treatments. This chapter concentrates on the description of the consequences of risks from these chemical control applications.

2. Cultural Control

The use of cultural control methods (crop rotation, short-season varieties, and mandatory postharvest stalk destruction) are anticipated to have minimal impact to human health, the physical environment, and nontarget species.

Tractors and other agricultural implements used in mandatory stalk destruction pose some risk of injury to equipment operators or others working near the equipment.

Use of machinery produces considerable dust and particulate matter which could contribute to respiratory problems or allergies, but program experience indicates that such effects have been minimal to nonexistent.

Mandatory stalk destruction can result in soil disruption (soil losses and erosion), but such effects would not exceed the effects associated with routine procedures that growers use during planting, tilling, and harvesting operations. Conversely, crop rotation tends to reduce erosion and replace soil nitrogen lost during cotton production.

The use of short-season varieties may have a beneficial influence on the physical environment in that there would be a longer dormant period during which the cotton crop is not in the field. Populations of wildlife (small mammals, reptiles, and insects) that inhabit ecological niches associated with cotton fields would not be adversely impacted by program cultural control practices to any greater extent than the effects of current practices (planting and mechanical harvesting).

3. Mechanical Control

The use of mechanical control methods (traps or attracticide devices) are anticipated to have minimal impact to human health, the physical environment, and nontarget species. Impacts could arise from the use of vehicles to place and monitor traps. Because workers or the public could have little exposure to minuscule amounts of pesticides (chlorpyrifos, dichlorvos, or propoxur) used in the traps, this alternative presents minimal risk. The only identifiable impacts on the physical environment would be minor soil displacement from vehicular and foot traffic during placement and monitoring of traps. Mechanical control would have a negligible effect on nontarget species, because other insect species are not attracted to the traps and the amount of pesticide associated with the traps is insufficient to affect larger livestock or wildlife that may encounter such traps.

4. Sterile Insect Technique

Although sterile insect technique is still being developed for program implementation, any use of this method is anticipated to have minimal impact to human health, the physical environment, and nontarget species.

No direct adverse effects on human health have been associated with the use of sterile insect technique, except for possible injury in the use of vehicles or mechanical release equipment. Exposure to moth scales or other insect parts from rearing and release operations is not expected to result in sufficient exposure to induce allergenic responses in workers or the public. Release of sterile pink bollworm moths is not expected to adversely impact air, land, or water. The release of sterile insects would not impact nontarget species, except to result in minimal feeding damage from adult insects to plants in the family Malvaceae (e.g., cotton, *Hibiscus* sp.) and provide a source of food to any species that are predators of pink bollworm.

5. Potential Consequences of Chemical Control Applications

This EA considers potential effects that may result from use of the pesticides that are proposed for this program: chlorpyrifos and permethrin. Description of the risks associated with pesticides in traps is presented in the section on mechanical control. A chemical risk assessment has been prepared to analyze the potential human health risks and environmental effects from chemical pesticide applications that have been proposed for the Pink Bollworm Cooperative Eradication Program (USDA, APHIS, 2001). This document provides greater detail on the formulations, use patterns, and potential consequences of the chemical control applications. The results of the comprehensive risk assessment are incorporated by reference into this environmental assessment and the information from the risk assessment is summarized here.

The risk assessment integrates hazard information (pesticides' toxicity and environmental fate) with exposure predictions to develop the risk characterization. Exposure to any chemical agent may be associated with some level of risk, assessed with a degree of uncertainty. The U.S. Environmental Protection Agency (EPA) classifications (40 CFR 162.10, July 8, 1985; EPA, 1986) are used to describe the relative toxicities of the pesticides discussed in this section.

Program applications of pesticides are limited to low application rates as part of a pheromone mixture and to control applications in cotton fields where detections from monitoring indicate the need to lower populations to levels where other methods can successfully complete eradication. The control applications are limited to cotton fields where monitoring indicates that at least 5% of the cotton is infested with pink bollworm larvae, or survey results have determined that other techniques have failed to meet necessary control thresholds. This limitation ensures that chemical applications are minimized by the program and resources are applied in the most effective manner. The consequences presented in this part of the chapter are based upon the assumption of direct exposure of the habitat or environmental resource to the treatment chemical. The consequences to some environmental quality indices, human health, and some nontarget species may be quite severe, but the limited use of these applications on a site-specific basis by the program can restrict treatments to areas and methods where these issues pose no risks of concern. Table III-1 below summarizes the proposed use patterns of each of the pesticides.

Table III-1. Proposed Use Patterns for Insecticides

Insecticide	Application rate (lb a.i./acre)	Application method for cotton crops	Active ingredient
Chlorpyrifos	0.75	Aerial and ground	O,O-diethyl O-(3,5,6-trichloro-2-pyridinyl) phosphorothioate
Permethrin	0.08	Aerial as part of a pheromone application	3-(phenoxyphenyl) methyl (±)-cis, trans-3-(2,2-dichloroethenyl)-2,2-dimethyl cyclopropanecar-boxylate

a. 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 the air quality in the general (overall) sense. Chlorpyrifos is relatively volatile, but the half life (the time necessary for the concentration of a chemical to decrease by 50 percent) of chlorpyrifos in air is only a few hours due to photolysis and various chemical reactions. Some permethrin residues may volatilize into the air, but this is unlikely to pose a primary route of exposure from program applications. The half-life for hydrolysis of permethrin varies from 124 to 347 days (Allsup, 1976). Some localized off-site drift may occur from program treatments.

Analysis of the environmental fate of each pesticide used in the Southwest Pink Bollworm Eradication Program under various meteorological conditions was assessed through use of the Agricultural Dispersal model (AGDISP) 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, 2001). The maximum drift determined by AGDISP occurred for chlorpyrifos at a distance of 100 feet under calm conditions (crosswind speed of 1 mph). The maximum drift under extreme conditions (crosswind speed of 10 mph) was determined to be 200 feet for chlorpyrifos. Permethrin drift was not projected to drift further than 50 feet and 100 feet for calm and extreme conditions, respectively. Deposition at 25 feet was determined to be 4.5 mg a.i./m^3 for chlorpyrifos and 0.5 mg a.i./m^3 for permethrin under calm conditions. Deposition at 25 feet was determined to be 48 mg a.i./m^3 for chlorpyrifos and 5.1 mg a.i./m^3 for permethrin under extreme conditions. Data from this modeling is applied to calculations of potential exposure of humans and nontarget species.

The potential for soil contamination also is 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). Chlorpyrifos readily binds or is adsorbed to soil particles. This may increase the persistence in soil or on organic matter in water to several months under certain conditions, but the persistence is generally only for a month or less. Although chlorpyrifos is persistent on sediments and organic matter, the rate of degradation is sufficient that any residues in air, water, and soil would not linger for extended periods beyond the growing season. This strong binding of chlorpyrifos to organic matter also makes the residues less bioavailable. Also, the program pesticides degrade rapidly and do not persist for great lengths of time in soil. Permethrin degrades readily in most soils, but organic matter may decrease the rate. The half-life in organic soil ranges from 3 to 6 weeks (Kaufman *et al.,* 1977). Degradation is slower under anaerobic, waterlogged soil conditions than in aerobic soil (Ohkawa *et al.,* 1978).

There is some potential for runoff of program pesticides if rainfall occurs shortly after treatments. However, operating procedures and additional protective measures (see section 3.c. of this chapter) serve to minimize the effects of program chemicals on water bodies and the public who could drink from or consume fish from those water bodies. The persistence of chlorpyrifos in sediments or on organic matter in water can extend for several months under certain conditions, but the residues generally persist for a month or less. Permethrin degrades rapidly in water, but it can persist in sediments. Other than adsorption to sediments, volatilization is the major route of removal from water, but microbial degradation may be important in deep, acidic lakes. Primary photolysis of permethrin is negligible, but hydrolysis is an important route only under alkaline conditions. The predicted insecticide losses from GLEAMS simulation of a 2-year storm in runoff water are 0.105 mg/L for chlorpyrifos and 0.0224 mg/L for permethrin. The predicted insecticide losses from GLEAMS simulation of a 2-year storm in eroded soil are 2.1 µg/g for chlorpyrifos and 0.224 µg/g for permethrin. Program applications are not expected to result in greater risk than that caused by existing pest control practices.

The potential for chemicals to leach into groundwater is related to their properties: solubility, soil/dissolved partition coefficient (K_{oc}), hydrolysis, and soil half-lives. Generally, substances that exhibit high solubility and low degradation rates have the greatest potential to migrate through soil layers and reach groundwater aquifers. The strong binding of chlorpyrifos to organic matter precludes leaching in soil. Permethrin is also not very mobile in soil and very little leaching has been reported (Wagenet *et al.,* 1985). Modeling data indicates negligible percolation of program pesticide residues through even the more porous soils. It is unlikely, therefore, that groundwater would be affected by program applications.

None of the program chemicals are expected to persist in exposed plants or animals. The half life of chlorpyrifos on plants is generally 1 to 4 days. Low levels of permethrin tend to persist in deciduous foliage and leaf litter (Kingsbury and Kreutzweiser, 1980). Chlorpyrifos is rapidly metabolized by mammals (1 to 2 days), but can bioconcentrate in fish and blue-green bacteria. Metabolism of permethrin in vertebrates is rapid and occurs through ester cleavage (National Research Council of Canada, 1986). There is a tendency of permethrin to bioconcentrate in estuarine environments (Schimmel *et al.,* 1983), but depuration of tissues occurs within a week.

b. Human Health

Exposure to any chemical agent is associated with some level of risk and the risk is assessed with some level of uncertainty. All human activity or inactivity is accompanied by risk and uncertainty. The decision to apply pesticides to control pink bollworm is based, at least implicitly, on a comparison of risks among the various alternative control methods and an assessment of the benefits associated with each alternative.

The risk assessment reviewed 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 this 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 this risk assessment. The risk comparison is designed to place both the quantitative assessments and their uncertainties into perspective with the problem posed by pink bollworm and the available control methods for dealing with this insect pest.

Chlorpyrifos is an organophosphate insecticide and its mode of toxic action occurs primarily through acetylcholinesterase (AChE) inhibition (Smith, 1987; Klaassen *et al.,* 1986). At low doses, the signs and symptoms of exposure in humans include localized effects (such as blurred vision) and systemic effects (such as nausea, sweating, dizziness, and muscular weakness). The effects of higher doses may include irregular heartbeat, elevated blood pressure, cramps, convulsions, and respiratory failure.

Permethrin is a synthetic pyrethroid and its 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 potential route of exposure to permethrin is dermal, but some exposure through inhalation is also possible.

The human health risk assessment includes 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 risk is quantified by comparing predicted exposure to toxicity reference levels based upon intrinsic hazards as described in detail in the Pink Bollworm Cooperative Eradication Program risk assessment (USDA, APHIS, 2001). Those toxicity reference values were applied to expected exposures to quantify risk. The general classification of the acute human oral toxicities is moderate for chlorpyrifos and slight to very slight for permethrin formulations. 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 do not differ substantially from conditions in the proposed program and are applicable to the 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 exposures 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 of the Pink Bollworm Eradication Program chemicals are presented in Table III-2.

Table III-2. Acute and Chronic Toxicity Reference Levels Used in This Analysis

Pesticide	Acute oral LD_{50} in rats (mg/kg)	Systemic NOEL[1] (mg/kg/day)		Reproductive/ developmental NOEL (mg/kg/day)
		Human	Rat	
Chlorpyrifos	97.0	0.03	0.01	2.5
Permethrin	430	5.0	5.0	50

[1]NOEL = the No Observed Effect Level. The highest dose level at which there are no observable differences between the test and control populations.

The risk determined for exposed individuals depends largely upon the exposure scenario. This information is summarized 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 mitigative measures to prevent exposure of the general public ensure that these potential risks are minimized.

Typical exposures pose negligible risk for dermal and inhalation exposure scenarios of chlorpyrifos. Risk is categorized as slight for typical dietary exposure scenarios of chlorpyrifos. However, this scenario involves the consumption of venison from wild animals, which are not usually hunted at the time of year when cotton is being treated for pink bollworm. Both typical and extreme exposures to permethrin pose negligible risks to the public. Risks vary from slight (inhalation) to substantial (consumption of fish) to the public for extreme exposures to chlorpyrifos. Mitigation measures (see section 3.c of this chapter) are designed to keep pesticides out of water and adherence to these measures precludes the elevated exposures and higher risks associated with fish consumption and water consumption.

Table III-3. Summary of Highest Public and Worker Risks* from Control Operations by Chemical

Exposure Scenarios	Chlorpyrifos		Permethrin	
	Typical	**Extreme**	**Typical**	**Extreme**
Public:				
Dermal and inhalation	E	C	E	E
Dietary	D	A	E	E
Workers:				
Pilot	B	A	E	E
Mixer/loader	B	A	E	E
Observer	A	A	E	E
Monitoring team	C	C	E	E
Ground applicators	A	A	E	E
Accidents:				
Worker		A		A
Public		A		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.

As was evident with the public, risks to workers have also been determined to be higher from exposures to chlorpyrifos than from exposures to permethrin. In particular, most extreme scenarios of chlorpyrifos are indicated to involve substantial risk. This assessment disregards the required safety procedures and mandatory protective gear, so the actual risk is considerably overstated. However, this does indicate the importance of adhering to safety procedures and wearing proper protective gear when applications of chlorpyrifos are made. Although the risks from the typical exposure scenarios of chlorpyrifos for workers are less hazardous than under the extreme exposure scenarios, ground applicators and observers must adhere to proper protective gear and safety procedures to prevent adverse health effects. All potential exposures of workers to permethrin pose negligible risk. The highest risk occurs from the exposure of workers in accidental scenarios. The highest risk is to workers with direct exposure from a spill or broken hose. Immediate cleansing of the exposed skin and other required safety procedures lower these risks to an acceptable level. Adherence to safety procedures is designed to prevent the accidental exposure scenarios to the general public.

(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 (impurities and degradation products) used in program treatments or to treatment 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 risk assessment. This qualitative assessment concentrates on the effects of program pesticide formulations' impurities and degradation products, the anticipated cumulative and synergistic effects, and the potential effects on sensitive groups.

The acute oral toxicity of chlorpyrifos is moderate to humans and mammals. Reports of chronic and subchronic toxicity tests, as measured by AChE inhibition, indicate that the toxicity is relatively low. However, the potential exposures are considerable and other systemic signs of exposure associated with non-lethal adverse effects are possible. Chlorpyrifos is not a dermal sensitizer, does not induce delayed neurotoxicity, and is not carcinogenic based upon studies acceptable to the Environmental Protection Agency (EPA, 1989a; EPA, 1984; EPA, 1989b). Tests of chlorpyrifos have been negative for neurotoxicity other than AChE inhibition, immunotoxicity, genotoxicity and mutagenicity in mammals, hematopoietic effects, and adverse effects of impurities and degradation products. Reproductive and developmental toxicity effects occur only at exposures higher than those anticipated in pink bollworm programs when safety procedures are adhered to and proper protective gear are used.

Permethrin has lower acute toxicity than chlorpyrifos. Permethrin use may cause mild, localized skin irritation to some individuals. Tests of permethrin have been negative for skin sensitization (immunotoxicity), neurotoxic effects other than those related to the toxicity mechanism, genotoxicity, mutagenicity, and teratogenicity.

Reproductive and developmental effects have only been noted for exposures greater than those anticipated from program applications of permethrin. Permethrin may be a weak oncogen and is suspected of having carcinogenic effects, but the potential exposure to permethrin from program applications would not result in these effects which are considered to be borderline by EPA.

(a) Impurities and Degradation Products

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 hazard to workers or the general public. The main metabolite of chlorpyrifos is 3,5,6-trichloropyridinol. It is structurally very similar to chlorpyrifos, but it is not considered to be an inhibitor of cholinesterase (EPA, OPP, 1989b). The major metabolites or degradation products of permethrin result from ester cleavage and include dihalovinyl or p-chlorophenyl isovaleric acids (National Research Council of Canada, 1986). These compounds are of less acute toxicity than permethrin.

(b) Cumulative and Synergistic Effects

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 likely to apply their pesticides at times when program treatments are not being made. Appropriate communication with growers and residents in adjacent properties through the notification process assures that most residents will be aware of the treatments, understand the meaning of the treatment flags, and adhere to the required re-entry periods. The re-entry period is the time when no one should enter a field unprotected following a treatment based on degradation of the pesticide applied. All workers are required to adhere to the re-entry periods following treatments.

Treatment of adjacent fields by growers 1 day or more before or after program treatment is considerably 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. Persistence of pesticide residues in specific environmental media can increase the likelihood of exposure to more than one pesticide. The degradation of the program pesticides is rapid on plants and in water under the warm conditions in the cotton fields. Cumulative effects should generally be limited to periods shortly after treatments. However, chlorpyrifos is quite persistent in soil and may remain active for several months. Chlorpyrifos binds readily to organic matter on plants and in water where it is only available through ingestion. Potential exposure from foliage or water can occur only within the first few days after treatment and limiting access to field workers with protective clothing precludes unacceptable exposures. Permethrin has a half-life of 3 to 6 weeks in organic soil, so it is not as persistent as chlorpyrifos. Any potential adverse cumulative effects from program pesticides would be limited to their period of persistence in the field.

Cumulative effects are most likely for multiple exposure to the compounds of the same chemical class. Chlorpyrifos is an organophosphate and strong inhibitor of acetylcholinesterase. As a result, there is potential for cumulative adverse effects with exposures to other compounds that inhibit acetylcholinesterase such as other organophosphates and carbamates. Permethrin has potential for cumulative adverse effects with exposures to other synthetic pyrethroids. Cumulative effects for program chemicals are most likely to occur at locations where there is reentry to fields too soon, since these compounds often persist longer on soil than in water or on plants. Azinphos-methyl, endosulfan, oxamyl, dicrotophos, methyl parathion, malathion, and synthetic pyrethroids are also generally used by growers in the areas where the pink bollworm program actions occur. Exposure to some of these compounds may result in additive or cumulative toxicity if a person were affected by a program pesticide.

Exposure to some pesticides could result in synergism such that the adverse effects from exposure to more than one pesticide exceed the sum of the adverse effects of exposure to each pesticide separately. Organophosphates may elicit synergistic effects if acetylcholinesterase activity has not recovered from inhibition by a simultaneous or earlier chemical exposure. Synergism of chlorpyrifos is possible with exposure to other organophosphate pesticides and carbamate pesticides (Knaak and O'Brien, 1960; Cohen and Murphy, 1970; Segal and Fedoroff, 1989; Koziol and Witkowski, 1982; Keil and Parrella, 1990; Horowitz *et al.,* 1987). Synergism of toxicity of organophosphates (such as chlorpyrifos) has also been shown when combined with synthetic pyrethroids (such as permethrin) or amitraz in some laboratory and field tests (Keil and Parrella, 1990; Horowitz *et al.,* 1987). This effect is possible if other pesticides are being applied in these areas. Synergism that results in increased toxicity is of greater concern for chlorpyrifos because this pesticide has higher acute toxicity and adverse effects from synergism are more likely. Although growers are unlikely to treat adjacent fields close to the same time as the pink bollworm treatments, there is potential for synergism if the growers do. Most of the pesticide compounds frequently used by growers at locations near pink bollworm treatment sites have either additive or synergistic properties with either chlorpyrifos or permethrin. Synergistic effects of these compounds are considerably less likely if proper safety procedures and reentry periods are followed for program and grower treatments. Although exposure to trap chemicals could result in cumulative or synergistic effects, the small amounts used and the trappers' safety precautions preclude such exposure. Refer to the risk assessment for more information about synergism.

(c) Connected Actions

In general, there is no reason to expect increased risk when combining chemical control with other control methods. In fact, it is reasonable to expect reduced risks because combined alternatives may reduce the number of chemical applications needed. Exposures from trapping, cultural control, sterile insect technique, and use of transgenic Bt cotton do not involve exposures to cumulative or synergistic compounds. Cultural control such as plowing under cotton stalks could involve exposure to other organophosphate or carbamate compounds, but the time of this exposure would differ from the time of treatment. Although exposure to the trap chemicals may occur simultaneously with control applications, the relatively non-toxic compounds used in traps are not additive, cumulative or synergistic with the pesticides used in chemical control applications.

The introduction of the pink bollworm to the United States has resulted in considerable losses to growers from Texas to California and in adjacent areas of Mexico. Success of the national program to eradicate the pink bollworm is contingent on good cooperation among the states and Mexico. The ability of the pink bollworm to spread naturally through flight makes any eradication effort challenging. Regional efforts may only be successful as part of an ongoing effort until the pink bollworm is eliminated from all areas within the flight range. A well coordinated eradication effort could reduce the need for growers to apply pesticides resulting in a commensurate decrease in potential adverse environmental impacts from agricultural practices.

(d) Groups at Special Risk

For each chemical control agent, an attempt was made to identify groups at special risk due to location, disease state, or other biological variation. Safety procedures assure that program 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. A careful assessment of their risk indicates that these individuals need to be notified of the times of pesticide application and instructed about safe reentry 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 reentry precautions can reduce appreciably their potential risks.

Individuals with 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 from pesticide use on cotton may be reduced.

c. Nontarget Species

Risk assessments were conducted to evaluate the potential effects of program pesticides on nontarget species (domestic animals, wildlife, and plants). The risk assessment integrated 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 used 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.

Chlorpyrifos is moderately to severely toxic to birds, moderately or less toxic to adult reptiles and amphibians, slightly to very highly toxic to tadpoles, and severely toxic to terrestrial invertebrates. It is particularly toxic to earthworms, honey bees, and some birds. Chlorpyrifos is very highly toxic to fish and aquatic invertebrates.

Algal blooms are often noted for ponds treated with chlorpyrifos due to the reduced grazing by zooplankton and increased phosphorous availability.

Permethrin is very slightly toxic to birds, severely toxic to honey bees, and very highly toxic to fish and aquatic invertebrates. Based upon the mode of toxic action and available data, it is expected that permethrin is highly toxic to most aquatic stages of reptiles and amphibians, but only slightly toxic to most terrestrial stages. All program chemicals should be kept out of bodies of water.

(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 is determined according to the following scale (U.S. EPA, OPP, 1986b):

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 would usually be expected from program applications would be those for the typical scenarios. Based upon this, the risks to terrestrial wildlife species are generally low for program use of permethrin. However, risks to some wildlife species are elevated for these use patterns. For example, risks from program use of chlorpyrifos are moderate to birds and terrestrial insects. Low risks from permethrin are anticipated for all exposed terrestrial taxa for both typical and extreme exposure scenarios except insects. Many of the potential exposures under the extreme scenario pose high risk and mitigations to preclude such scenarios are desirable, particularly for chlorpyrifos applications.

Table III-4. Summary of Highest Risks to Nontarget Terrestrial Species from Insecticides

Species	Chlorpyrifos		Permethrin	
	Typical	Extreme	Typical	Extreme
Birds	B	A	C	C
Mammals	C	B	C	C
Reptiles	C	B	C	C
Amphibians	C	C	C	C
Insects	B	A	B	A
Domestic animals	C	C	C	C

Risks are categorized as follows:
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.

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 pesticides used in the program would eliminate all pollinators for the length of time sufficient to prevent pollination, but pesticides could temporarily 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 with chlorpyrifos or permethrin, program personnel will notify registered apiarists in or near the treatment area of the date and approximate time of the treatment application.

(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 of 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 (U.S. EPA, OPP, 1986b):

A = High risk – EEC is greater than or equal to 1/2 LC_{50} for aquatic species.
B = Moderate risk – EEC is greater than or equal to 1/10 LC_{50} but is 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 wildlife 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 nature of bottom sediments. The tendency of pesticides to settle, degrade, and adsorb 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 wildlife species are presented in Tables III-5 (ponds) and III-6 (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 and runoff into standing bodies of water are important to protect fish and other nontarget aquatic species.

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 use of chlorpyrifos remains high to fish and aquatic invertebrates. Therefore, mitigation measures generally should be employed to prevent drift and runoff from entering flowing water.

Table III-5. Summary of Highest Risks to Aquatic Species in Ponds

Species	Chlorpyrifos		Permethrin	
	Typical	Extreme	Typical	Extreme
Fish	A	A	A	A
Aquatic Invertebrates	A	A	A	A
Amphibians	A	A	B	A

Risks are categorized as follows:
A = High risk – estimated environmental concentration (EEC) is greater than or equal to 1/2 LC_{50} or 1/2 EC_{50} for aquatic species.
B = Moderate risk – EEC is greater than or equal to 1/10 LC_{50} or 1/10 EC_{50} but is less than 1/2 LC_{50} or 1/2 EC_{50} for aquatic species.
C = Low risk – EEC is less than 1/10 LC_{50} or 1/10 EC_{50} for aquatic species.
ND = No data.

Table III-6. Summary of Highest Risks to Aquatic Species in Creeks

Species	Chlorpyrifos		Permethrin	
	Typical	Extreme	Typical	Extreme
Fish	A	A	C	C
Aquatic Invertebrates	A	A	A	A
Amphibians	C	C	C	C

Risks are categorized as follows:
A = High risk – estimated environmental concentration (EEC) is greater than or equal to 1/2 LC_{50} or 1/2 EC_{50} for aquatic species.
B = Moderate risk – EEC is greater than or equal to 1/10 LC_{50} or 1/10 EC_{50} but is less than 1/2 LC_{50} or 1/2 EC_{50} for aquatic species.
C = Low risk – EEC is less than 1/10 LC_{50} or 1/10 EC_{50} for aquatic species.
ND = No data.

3. Unique or Special Concerns

a. Site-specific Characteristics

Unique or special concerns for the proposed program area included potential pesticide impact to wetlands, major water bodies, groundwater, and potential outbreaks of secondary pests (such as beet armyworm).

The climate of the southwest is generally dry and arid, but there are major rivers that occur in cotton-growing areas. Major rivers include the Colorado, the Gila, the Rio Grande, and the Pecos. Protection of these water resources is an important consideration for program managers. In general, wetlands or water bodies are avoided in program operations and are further protected by the program's routine operational procedures and mitigation measures; and recommendations for additional protective measures that appear in the next section of this EA.

The protection of groundwater is also an important consideration. The lack of surface water in many areas requires that freshwater be obtained from underground aquifers. Groundwater was the source for 36 percent of the total water usage in New Mexico in 1990. Groundwater is also an important source of freshwater in the

El Paso area of Texas. Much of this water is used in irrigation. Modeling data indicate that the physical properties and program use of chemicals make it unlikely that detectable leaching to groundwater would occur.

Consistent with Executive Order No. 12898, "Federal Actions To Address Environmental Justice in Minority Populations and Low-Income Populations," APHIS considered the potential for disproportionately high and adverse human health or environmental effects on any minority populations and low-income populations. Likewise, APHIS analyzed the potential for disproportionately high and adverse environmental health and safety risks to children from proposed program actions in fulfillment of issues related to Executive Order No. 13045, "Protection of Children From Environmental Health Risks and Safety Risks." The proposed program is designed to treat only cotton fields and preclude exposures to children and residents of adjacent properties. The standard operating procedures and additional protection measures prevent the most likely exposure scenarios to both workers and the general public. Based upon this approach, no disproportionate adverse effects on children, minorities, or low-income populations are anticipated as a consequence of implementing the preferred action.

Direct impacts, indirect impacts, cumulative impacts, and synergistic effects were discussed in detail in the pink bollworm risk assessment. Review of the site-specific considerations of the conditions that exist in this program area suggest that the discussions and conclusions reached in the risk assessment related to these impacts apply also to this program.

b. Endangered and Threatened Species

The Endangered Species Act (ESA) and its implementing regulations require federal agencies to consult with the U.S. Department of the Interior's Fish and Wildlife Service (FWS) and/or the U.S. Department of Commerce's National Marine Fisheries Service (NMFS) to ensure 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. Federal agencies must determine if their actions "may affect" an endangered or threatened species or its habitat; if that determination is positive, they must initiate consultation with the FWS and/or the NMFS. According to the regulations, the federal agency need not initiate formal consultation if it obtains the concurrence of the FWS and/or the NMFS, through informal consultation, with its determination that the action "is not likely to adversely affect" the endangered or threatened species or its habitat. APHIS is consulting with FWS regarding endangered and threatened species and will comply with all protection measures stipulated in that consultation and mutually agreed on with FWS.

c. Additional 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 proposed Pink Bollworm Eradication Program, may further reduce the potential for adverse environmental effects from this program.

Pesticide Applications

1. Program personnel overseeing applications of organophosphate and synthetic pyrethroid (chlorpyrifos and permethrin) pesticides are required to wear protective clothing or remain inside a closed vehicle with recirculating air, depending on the circumstances of the application.

2. Unprotected workers will be advised of the respective reentry periods following treatment.

3. Program personnel shall immediately cease spraying operations if members of the public are observed within 100 feet of a cotton field being sprayed with chlorpyrifos or permethrin.

4. 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.

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

6. Program personnel will familiarize aerial applicators with applicable operational procedures, mitigation measures, and protection measures.

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

8. 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.

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

Notification Procedures

1. 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.

2. 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.

3. 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.

4. 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.

5. Before beginning treatment with chlorpyrifos or permethrin, 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, Organizations, and Individuals Consulted

William Grefenstette, 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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Animal and Plant Health Inspection Service
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Referneces

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Finding of No Significant Impact
for
Southwest Pink Bollworm Eradication Program
Environmental Assessment
April 2002

The U.S. Department of Agriculture, Animal and Plant Health Inspection Service (APHIS), has prepared an environmental assessment (EA) that analyzes the potential environmental consequences of alternatives for eradication of the pink bollworm, a serious pest of cotton, in the Southwest United States. The EA, incorporated by reference in this document, is available from:

U.S. Department of Agriculture
Animal and Plant Health Inspection Service
Plant Protection and Quarantine
Program Support
4700 River Road, Unit 134
Riverdale, MD 20737-1234

or

U.S. Department of Agriculture
Animal and Plant Health Inspection Service
Plant Protection and Quarantine
Western Regional Office - Suite 204
1629 Blue Spruce Drive
Fort Collins, CO 80524

The EA analyzed the following alternatives: no action, pink bollworm suppression, and pink bollworm eradication (the proposed program). Each alternative was determined to have potential environmental consequences. The eradication program was preferred because of its capability to achieve the eradication objective in a way that reduces the magnitude of those potential environmental consequences. Program standard operational procedures and mitigative measures serve to negate or reduce the potential environmental consequences of this program.

APHIS has determined that there would be no significant impact to the human environment from the implementation of the proposed program. APHIS' Finding of No Significant Impact for this program was based upon its analysis of the program's characteristics and its anticipated environmental consequences, as analyzed in the EA. APHIS has considered the potential effects on endangered and threatened species and their critical habitats, and has concluded that the program would have no effect.

I find that the proposed program will pose no disproportionate adverse effects to minority and low-income populations and the actions undertaken for this program are entirely consistent with the principles of "environmental justice," as expressed in Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-income Populations." Lastly, because I have not found evidence of significant environmental impact associated with the proposed program, I further find that an environmental impact statement does not need to be prepared and that the proposed program may be implemented.

William J. Grefenstette
for Osama El-Lissy
Operations Officer
Plant Protection and Quarantine
Animal and Plant Health Inspection Service

04/26/02
Date