



**United States
Department of
Agriculture**

Marketing and
Regulatory
Programs

Animal and
Plant Health
Inspection
Service



In Cooperation
with:

Farm
Service
Agency

Tennessee Cooperative Boll Weevil Eradication Program

Environmental Assessment, July 1998

Tennessee Cooperative Boll Weevil Eradication Program

Environmental Assessment, July 1998

Agency Contact:

Anthony Brashear, Program Manager
Southeast Boll Weevil Eradication Program
Plant Protection and Quarantine
Animal and Plant Health Inspection Service
U.S. Department of Agriculture
Bell Oaks Plaza, Suite B
2424 East South Blvd.
Montgomery, AL 36116-2506
Telephone: (334)-223-7439

The U.S. Department of Agriculture (USDA) prohibits discrimination in its programs on the basis of race, color, national origin, gender, religion, age, disability, marital or familial status, or political beliefs. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (braille, large print, audiotape, etc.) should contact the USDA Office of Communications at 202-720-5881 (voice) or 202-720-7808 (TDD).

To file a complaint, write the Secretary of Agriculture, USDA, Washington, DC 20250, or call 202-720-7327 (voice) or 202-720-1127 (TDD). USDA is an equal employment opportunity employer.

Mention of companies or commercial products in this report does not imply recommendation or endorsement by the U.S. Department of Agriculture over others not mentioned. USDA neither guarantees nor warrants the standard of any product mentioned. Product names are mentioned solely to report factually on available data and to provide specific information.

This publication reports research involving pesticides. All uses of pesticides must be registered by appropriate State and/or Federal agencies before they can be recommended.

CAUTION: Pesticides can be injurious to humans, domestic animals, desirable plants, and fish or other wildlife—if they are not handled or applied properly. Use all pesticides selectively and carefully. Follow recommended practices for the disposal of surplus pesticides and pesticide containers.

Table of Contents

I.	Need for the Proposal	1
A.	Introduction	1
B.	Purpose and Need	2
II.	Alternatives	2
A.	Limited No Action	3
B.	Biological Control	3
C.	Chemical Control	4
D.	Cultural Control	5
E.	Mechanical Control	5
F.	Sterile Insect Technique	6
III.	Environmental Impacts	6
A.	Anticipated Environmental Impacts	6
B.	Unique or Special Concerns	13
C.	Operational Procedures and Mitigative Measures	16
D.	Summary of Environmental Impacts	21
IV.	Agencies, Organizations, and Individuals Consulted	22

I. Need for the Proposal

A. Introduction

Since its introduction in southern Texas in the late 1800's, the boll weevil (*Anthonomus grandis* Boheman) has spread across the U.S. Cotton Belt. It annually causes substantial economic losses to the agricultural industry and to consumers. Since the early 1950's, the nation's agricultural community has acknowledged the need for a beltwide strategy for controlling the boll weevil. Since the first pilot program in 1971, programs implemented in coordinated, incremental fashion have been successful in eradicating the boll weevil from over 4.5 million acres in major areas of the U.S. Cotton Belt.

The U.S. Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), has been cooperating with State organizations and cotton grower organizations in a number of programs to eradicate the boll weevil. The programs are components of the National Boll Weevil Cooperative Control Program (national program), which adopted an incremental strategy to eradicate the boll weevil from the U.S. Cotton Belt. In accordance with the National Environmental Policy Act of 1969 (42 U.S.C. 4321–4347 (NEPA)) and its implementing regulations, APHIS and its cooperators analyzed the potential environmental effects of the national program in a programmatic document, the “National Boll Weevil Cooperative Control Program, Final Environmental Impact Statement—1991” (EIS).

APHIS and its cooperators also analyzed the individual programs that are components of the national program within separate site-specific environmental assessments (EA's). Previously, APHIS and its cooperators analyzed a number of programs for parts of the Southeast (including parts of Tennessee), all with similar characteristics, in this fashion. The remaining infestations of boll weevil in Tennessee occur primarily in the western part of the state in the floodplain between the Tennessee River and the Mississippi River. Because of a number of reasons, including (1) the related nature of the programs (NEPA and its implementing regulations require joint analysis of related actions), (2) the availability of new control methods, and (3) the gradual evolution of the programs, APHIS has prepared this single EA for all programs in Tennessee. In it, APHIS analyzes the potential effects of boll weevil control alternatives (including no action) and considers characteristics and issues that may be special or unique to the area. Lastly, it summarizes and incorporates by reference all the discussions, analyses, and conclusions of the EIS.

B. Purpose and Need

APHIS is proposing to cooperate with other Federal and State agencies, grower groups, and growers in a program to eradicate the boll weevil from cotton fields in the state of Tennessee. APHIS program officials say that the proposed action is needed to (1) reduce agricultural losses suffered by growers as a result of continuous boll weevil infestation, (2) substantially reduce the amount of pesticides used by growers and the cost of purchasing and applying those pesticides to control boll weevil and other cotton pests, (3) maintain the biological integrity and efficacy of the national program to eradicate the boll weevil, (4) maintain the long-term biological diversity in and around cotton fields, and (5) comply with relevant pest control statutes and regulations.

APHIS' authority for cooperation in this proposed program is based upon and complies with the Incipient and Emergency Control of Pests [Act] (1937), the Organic Act of the Department of Agriculture (1944), the Cooperation with State Agencies in the Administration and Enforcement of Certain Federal Laws Act (1962), and the Food Security Act of 1985.

Future funding for proposed boll weevil eradication programs such as this, which are components of a national incremental strategy to eradicate the boll weevil from the U.S. Cotton Belt, may be provided in part through loans from the USDA's Farm Service Agency (FSA). The FSA loan program, as proposed, would implement provisions of the "Agriculture, Rural Development, Food and Drug Administration, and Related Agencies Appropriations Act, 1997," which directed the Secretary of Agriculture to implement a new loan program to facilitate efforts to eradicate the boll weevil and to protect previous program areas from reinfestation. For proposed boll weevil eradication programs where there is a high probability that the grower organization may apply for a boll weevil eradication loan, FSA will serve as a cooperating agency for determining that no significant impacts will exist. (FSA has no managerial role in boll weevil eradication programs, but functions solely in the approval, processing, and granting of loans to the programs' member organizations.)

II. Alternatives

The national program to eradicate the boll weevil employs a beltwide integrated control strategy. Integrated control, in this case, involves the selection of a particular control method or combination of methods for an individual site, based on factors including variations in boll weevil biology, availability of overwintering sites, environmental concerns, weather patterns, and crop production requirements. Consistent with the strategy used in the national program, integrated control alternatives considered within this EA include

(1) limited no action, (2) biological control, (3) chemical control (pesticides listed in Table 1), (4) cultural control (use of short-season cotton varieties and/or mandatory stalk destruction), (5) mechanical control (mass trapping and bait tubes), and (6) sterile insect technique.

A. Limited No Action

For the purposes of this proposed program, the limited no action alternative is defined as no cooperative control action in an individual site within the program's area of operation. A variety of interpretations may exist for the no action alternative, including entirely (no program) or possibly no Federal involvement. However, the most probable result of implementing either of these interpretations would be the long-term continuation of current patterns of high pesticide use. Under those circumstances, the environmental effects of no action would be more severe than those that might be incurred in the implementation of the proposed action. In APHIS' judgment therefore, the public's interest is better served through analysis of a limited no action alternative.

It is conceivable that, because of a site's special characteristics, no control actions of any kind would be implemented. For example, measures that are agreed upon for the protection of endangered and threatened species could involve the enforcement of "no action" buffer zones. For the program to be effective in such areas, it would have to employ indirect methods such as mass trapping, the release of sterile boll weevils (when the technology is perfected and approved) in the surrounding areas, or other methods which through attrition may eliminate the boll weevils from that site. The limited no action alternative affords the program a degree of flexibility to deal with a few extremely sensitive sites that may occur within a broad program area.

B. Biological Control

Biological control (biocontrol) agents are predators, parasites, or microbial pathogens (viruses, bacteria, and fungi) that can be used to provide natural suppression of some insect species that damage agricultural crops. APHIS has reviewed research done on various biological control agents, including *Naturalis-L* and the parasitic wasp, *Catolaccus grandis*. Constraints associated with the use of biological control agents for boll weevil control include the lack of commercially available artificial diets, effective mass propagation systems, or release systems. APHIS will continue to review, consider, and support the use of new or improved biological control strategies for the control of boll weevil and other insect pests.

C. Chemical Control

Fifteen pesticides have been analyzed for program treatments and are registered for this use by the U.S. Environmental Protection Agency (EPA): azinphos-methyl, bifenthrin, cyfluthrin, lambda cyhalothrin, cypermethrin, deltamethrin, dicrotophos, diflubenzuron, endosulfan, esfenvalerate, malathion, methyl parathion, oxamyl, tralomethrin, or zeta-cypermethrin (refer to the EIS and chemicals risk assessment for detailed information). Three pesticides (chlorpyrifos, dichlorvos, and propoxur) may be used in a contained manner in traps. Application methods, timing, and frequencies may vary (table 1 summarizes application rates and methods).

Table 1. Proposed Pesticides

Insecticide	Application Rate (lb a.i./acre)	Application Method for Cotton Crops	Active Ingredient
Malathion	1.17	ULV aerial and ground	O,O-dimethyl phosphorodithioate of dimethyl mercaptosuccinate
Azinphos-methyl	0.25	ULV aerial and ground	Phosphorodithioic acid, O,O-dimethyl S-[4-oxo-1,2,3-benzotriazin-3(4H)-yl]methyl ester
Diflubenzuron	0.125	ULV aerial and ground	N-[(4-chlorophenyl) amino carbonyl]-2,6-difluorobenzamide
Methyl parathion	0.5	Aerial (encapsulated) Ground equipment	Phosphorodithioic acid, O,O-dimethyl O--(4-nitrophenyl) ester
Endosulfan	0.5	Aerial and ground	Hexachlorohexahydromethano-2,4,3-benzodioxathiepin-3-oxide
Oxamyl	0.25	Aerial and ground	Methyl N'N'-dimethyl-N-[(methylcarbamoyl)oxy]-1-thiooxamimidate
Bifenthrin	0.1	Aerial and ground	(2-methyl[1,1-biphenyl]-3-yl)-methyl-3-(2-chloro-3,3,3-trifluoro-1-propenyl)-2,2-dimethyl cyclopropane carboxylate
Cyfluthrin	0.05	Aerial and ground	Cyano (4-fluoro-3-phenoxyphenyl) methyl 3-(2,2-dichloroethenyl)-2,2-dimethyl cyclopropane carboxylate
Lambda cyhalothrin	0.05	Aerial and ground	[1-alpha (S), 3 alpha (Z)]-(±)-cyano-(3-phenoxyphenyl) methyl 3(2-chloro-3,3,3-trifluoro-1-propenyl)-2,2-dimethyl-cyclopropane carboxylate

Table 1, continued

Table 1, continued

Insecticide	Application Rate (lb a.i./acre)	Application Method for Cotton Crops	Active Ingredient
Cypermethrin	0.1	Aerial and ground	alpha-cyano-m-phenoxybenzyl 3-(2,2-dichlorovinyl)-2,2-dimethyl cyclopropane carboxylate
Deltamethrin	0.03	Aerial and ground	(S)-alpha-cyano-3-phenoxybenzyl (1R, 3R)-3-(2,2-dibromovinyl)-2,2-dimethyl cyclopropane carboxylate
Dicrotophos	0.5	Aerial and ground	2-dimethylcarbamoyl-1-methylvinyl dimethyl phosphate
Esfenvalerate	0.05	Aerial and ground	(S)-cyano(3-phenoxyphenyl)methyl (S)-4-chloro-alpha-(1-methylethyl)benzene acetate
Tralomethrin	0.024	Aerial and ground	(1R,3S)3[(1'RS)(1',2',2'-tetrabromoethyl)]-2,2-dimethyl cyclopropane carboxylic acid (S)-alpha-cyano-3-phenoxybenzyl ester
Zeta-cypermethrin	0.045	Aerial and ground	alpha-cyano (3-phenoxyphenyl)methyl (+)-cis-trans 3-(2,2-dichloroethenyl)-2,2-dimethyl cyclopropane carboxylate

D. Cultural Control

Cultural control is the modification of the crop environment to make it less favorable for pest reproduction and survival. The principal cultural methods proposed for use in this program (and analyzed in the EIS) are use of “short-season” techniques (growing short-season cotton varieties and manipulating planting and harvest dates) and mandatory stalk destruction (postharvest stalk destruction with prohibition against cultivation of perennial cotton).

E. Mechanical Control

Mechanical control involves the mass trapping of boll weevils. The boll weevils are attracted to a trap or an “attracticide device” (e.g., BWACT—“boll weevil attract and control tube”) containing a species-specific sex attractant and aggregation pheromone (a chemical that motivates insect behavior or development).

F. Sterile Insect Technique

Sterile insect technique (SIT) involves the rearing, sterilization, and release of sterile weevils into wild boll weevil populations. Field trials have shown variable results for this alternative, and program managers do not consider the technology to be ready for implementation at this time. APHIS will continue to investigate the potential of SIT for eradication of the boll weevil.

III. Environmental Impacts

A. Anticipated Environmental Impacts

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 focuses on the potential effects of those pesticides. The EA uses both quantitative methods (especially to determine risks associated with the use of program chemicals) and qualitative methods to predict risk.

1. Limited No Action

Implementation of the limited no action alternative would mean that no control method would be used in cotton fields near the most sensitive sites, such as hospitals, schools, or wildlife refuges. Although this may result in less environmental impact initially than if these adjacent fields were treated, the untreated fields could serve as refuges for the pest and result in the need for prolonged treatments on surrounding areas until the boll weevil population is eliminated from its refuge site. Considering the prevailing need to protect sensitive sites, the use of the limited no action alternative could have an overall beneficial effect on the environment. Conversely, the lack of such an alternative probably would jeopardize the completion of the program, thereby influencing growers to return to previous pesticide uses with associated adverse environmental impacts.

The net effect of use of the limited no action alternative on human health would be a reduced risk of exposure and effects from program pesticides (in the short-term for the limited no action site and in the long-term for the entire program area). The net effect on the physical environment (air, land, and water) would be a reduction of residues and contaminants from program pesticides (in the short-term for the limited no action site and in the long-term for the entire program area). The net effect on sensitive nontarget species (wildlife, livestock, and domestic animals and plants) would be a reduced risk of exposure and effects from program pesticides. The overall effect of use of the limited no action alternative, therefore, is regarded as positive.

2. Biological Control

No direct adverse effects would be associated with the use of biological control agents. An indirect adverse effect might result if the biological control agents were not effective and the program or growers had to resort to the use of chemical pesticides late in the season to control boll weevils. The net effect of successful use of biological control agents on human health would be a reduced risk of exposure and effects from program pesticides. The net effect on the physical environment (air, land, and water) would be a reduction of residues and contaminants from program pesticides. The net effect on sensitive nontarget species (wildlife, livestock, and domestic animals and plants) would be a reduced risk of exposure and effects from program pesticides. The overall effect of the use of biological control agents, therefore, is regarded as positive.

3. Chemical Control

This EA considers potential effects that may result from use of any of the fifteen pesticides that are proposed for this program. Description of the risks associated with pesticides in traps is presented in the section on mechanical control. Refer to the EIS and chemicals risk assessment for greater detail on the formulations and use patterns. The EA's risk assessment integrated 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.

a. Human Health

The EA relied on quantitative risk assessment, using potential exposure scenarios for each program chemical application. The EA also relied on qualitative risk assessment, considering factors that may influence exposure and risk and that cannot be related quantitatively to exposure, or that may be beyond the capacity of program managers to control.

(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 EIS (volume 1, appendix B, section B.4.) and in the chemicals risk assessment (chapter 3). Those toxicity reference values were applied to expected exposures to quantify risk. The classifications of the program pesticides' acute human oral toxicities are as follows: slight for diflubenzuron, esfenvalerate, and tralomethrin; moderate for bifenthrin, cyfluthrin, lambda cyhalothrin, cypermethrin, deltamethrin, malathion, and zeta-cypermethrin; severe for azinphos-methyl, dicrotophos, endosulfan, methyl parathion, and oxamyl. Refer to the discussion in the EIS and chemicals risk assessment for a more thorough review of toxicities and hazards of the program pesticides. The scenarios analyzed quantitatively in the EIS (volume 1,

appendix B, section B.3.) and in the chemicals risk assessment (chapter 4, section A) 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 margin of safety was determined by dividing the toxicity reference level of the pesticide by the exposure level determined in the scenario. The potential risks to program workers and the general public are presented in the programmatic EIS (volume 1, appendix B, section B.4.) and in the chemicals risk assessment (chapter 5, section A). Comprehensive training of all workers assures that there will be adequate margins of safety to prevent adverse effects for all likely exposure routes. Likewise, the margins of safety to the general public indicate minimal risk and adequate safety against adverse effects.

(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. Thorough discussions of qualitative risks are presented in the EIS and the chemicals risk assessment. This EA qualitatively assesses the effects of program pesticide formulations' impurities and degradation products, the anticipated cumulative and synergistic effects, and the effects on sensitive groups.

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.

Cumulative effects are those which result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions. Cumulative effects from simultaneous exposure to program treatments and to growers' treatments of other crops in adjacent fields are possible, but highly unlikely. To avoid risks for applicators and workers, growers are likely to make other pesticide applications at times when program treatments are not being made. Appropriate communication with growers and residents in adjacent properties through the notification process would assure that most residents will be aware of the treatments, understand the meaning of any treatment flags, and adhere to the required reentry periods.

Synergistic impacts are those which occur when two or more chemicals combine to cause effects that are different or stronger than the sum of their individual effects. Synergistic effects are possible between organophosphate pesticides (azinphos-methyl, dicotophos, malathion, and methyl parathion) and carbamate

pesticides (oxamyl). Organophosphates and carbamates may elicit synergistic or cumulative effects if acetylcholinesterase activity has not recovered from inhibition by a simultaneous or earlier chemical exposure. Although growers are unlikely to treat adjacent fields synchronously with the boll weevil treatments, the potential for synergism is considerable if such activity takes place. Synergistic effects are also possible between organochlorine pesticides (endosulfan) and synthetic pyrethroid pesticides (bifenthrin, cyfluthrin, lambda cyhalothrin, cypermethrin, deltamethrin, esfenvalerate, tralomethrin, and zeta-cypermethrin). Synergism of diflubenzuron is possible for individuals who are smokers, but is unlikely to pose any risk to other groups in the population. Cumulative and 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 EIS and chemicals risk assessment for more information about synergism.

Certain groups may have increased risk due to location, disease state, or other biological characteristics. Those who live next to cotton fields are at greatest risk. Infants may be more sensitive than adults to the effects of exposure to program pesticides. Individuals on certain medicines, such as pentobarbitone, may be at increased risk. Some individuals may be less tolerant to 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 may reduce appreciably their risk.

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. It is possible that some residents with MCS could be disproportionately affected by program pesticide treatments. However, because the program would tend to reduce pesticide use on cotton, the overall incidence of MCS from pesticide use on cotton probably would be reduced.

b. The Physical Environment

The chemical pesticides proposed for use in the program have potential to affect the physical environment (air, land, and water). 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).

Program pesticides are not expected to affect the air quality in the general (overall) sense. Localized off-site drift may occur, however, from program treatments. Any off-site drift would be expected to be minimal because the proposed program chemicals have very low vapor pressures and are essentially nonvolatile, and because other program precautions are taken (refer to table 2-1 of the EIS and chapter 2 of the chemicals risk assessment).

The potential for soil pollution 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). Also, the program pesticides degrade rapidly and do not persist for great lengths of time in soil (volume 1, appendix B, section B.8. of the EIS and chapter 2 of the chemicals risk assessment).

There is some potential for runoff of program pesticides if rainfall occurs shortly after treatments. However, operating procedures and recommended mitigation measures (tables 2-1 and 2-2 of the EIS) 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. Program applications are unlikely 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. Modeling data indicates percolation of program pesticide residues through even the more porous soils to be negligible. It is unlikely, therefore, that groundwater would be affected.

c. Nontarget Species

Risk assessments were conducted to evaluate the potential effects of program pesticides on nontarget species (domestic animals, wildlife, and plants). Following methodology detailed in the EIS (volume 1, appendix B, sections B.5. to B.7.) and chemicals risk assessment (chapter 6), the risk assessment integrated hazard assessment and exposure assessment to arrive at a characterization of risk. Estimations of exposures to program insecticides for routine and extreme exposure scenarios were compared to toxicity reference levels for representative nontarget species. Based upon this comparison, risks were characterized as low, moderate, or high.

Detailed results of the nontarget risk assessments may be found in tables 4-3 through 4-6 in the EIS, and tables VI-1 through VI-3 of the chemicals risk assessment. These data are summarized for terrestrial and aquatic species in the next paragraphs.

The risks to terrestrial wildlife species are generally low for program use of malathion, azinphos-methyl, diflubenzuron, cyfluthrin, lambda-cyhalothrin, esfenvalerate, tralomethrin, and zeta-cypermethrin. Risks to some wildlife species are elevated for use of the other pesticides. For example, risks to mammals are moderate for endosulfan, but low for all other wildlife groups in the typical exposure scenarios. Risks from methyl parathion applications are elevated for birds, reptiles, amphibians, and insects. Risks from oxamyl applications are elevated for birds, mammals, reptiles, and amphibians. Risks from dicotophos applications are high to mammals and birds, but moderate to reptiles, amphibians, and insects. Applications of bifenthrin and cypermethrin pose moderate risks to insects, but applications of deltamethrin pose high risk to insects.

The risks to wildlife species in ponds are generally low for program use of endosulfan, dicotophos, and oxamyl. Risks to some aquatic wildlife are elevated for use of the other pesticides. For example, risks to aquatic invertebrates are moderate for diflubenzuron and methyl parathion, but low for all other wildlife groups in the typical exposure scenarios for ponds. Risks from malathion and azinphos-methyl applications are elevated for fish, aquatic invertebrates, and amphibians in ponds. Risks from any applications of synthetic pyrethroids (bifenthrin, cyfluthrin, lambda cyhalothrin, cypermethrin, deltamethrin, esfenvalerate, tralomethrin, and zeta-cypermethrin) are high to fish, aquatic invertebrates, and amphibians in ponds.

Residues of pesticides entering flowing water (i.e., creeks) dissipate more readily than ponds due to constant movement of water from upstream that lowers the potential exposure concentration. This effect diminishes the risk in the exposure scenarios for creeks relative to ponds. Risks to wildlife species in creeks are generally low for program use of diflubenzuron, endosulfan, oxamyl, dicotophos, cyfluthrin, lambda cyhalothrin, esfenvalerate, and tralomethrin. Risks to some aquatic wildlife are elevated for use of the other pesticides. For example, risks to aquatic invertebrates are elevated for malathion, methyl parathion, cypermethrin, and deltamethrin, but low for all other wildlife groups in the typical exposure scenarios for creeks. Risks from zeta-cypermethrin applications are elevated for fish. Risks from azinphos-methyl applications are elevated for fish and aquatic invertebrates. Risks from applications of bifenthrin are moderate for all aquatic 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 are important as crop pollinators and honey producers. As a precaution, prior to treatments, program personnel will notify registered apiarists in or near the treatment area of the date and approximate time of the treatment.

The Migratory Bird Treaty Act prohibits the taking of migratory birds without a permit. "Take" is to pursue, hunt, shoot, wound, kill, capture, or collect, or attempt to pursue, hunt, shoot, wound, kill, capture, or collect migratory birds. The proposed program would not involve intentional take of migratory birds; any take would be incidental.

4. 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).

5. 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 would 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, and small amounts of plastic that could be left in the environment from broken 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 the traps.

6. Sterile Insect Technique

Although sterile insect technique was not considered ready for implementation, its use 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. Release of sterile boll weevils is not expected to adversely impact air, land, or water. The release of sterile boll weevils would not impact nontarget species, except to result in minimal feeding damage to plants in the family Malvaceae (e.g., cotton, *Hibiscus* sp.).

B. Unique or Special Concerns

1. Site-specific Characteristics

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

In general, direct impacts, indirect impacts, cumulative impacts, and synergistic effects were considered in detail in the EIS and chemicals risk assessment. The site-specific consideration of the conditions that exist in this program area revealed no evidence to suggest that the EIS' discussions and conclusions related to these impacts would not apply also to this program.

a. Wetlands and Water Bodies

There are several major water bodies within the program area that are adjacent or close to treatment areas. The lush flatlands of western Tennessee were created by the ancient floodplains of the Mississippi River. The Tennessee River also occurs close to some program areas. There are many lakes and other water bodies associated with these rivers. 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 (listed in the EIS, tables 2-1 and 2-2); recommendations for additional protective measures appear in the next section of this EA.

The protection of groundwater is also an important consideration. The Gulf Coastal Plain Regional Aquifer includes most of western Tennessee. The potential for aquifer contamination is determined by the depth to groundwater below the surface, the depth and types of soil above the aquifer, and other factors. Fortunately, many parts of the program area have surface clays of relatively low permeability which impede downward migration of contaminants into underlying aquifers. Modeling data indicate that the physical properties and program use of chemicals make it unlikely that detectable leaching to groundwater would occur.

b. Natural Areas

In addition to consideration for freshwater resources, APHIS analyzed the potential of the program to affect important natural areas. There are many sensitive sites in western Tennessee. The Chickasaw and Natchez State Parks and Forests are important recreational areas. Major sport fishing areas occur on Kentucky Lake, the Mississippi River, Pickwick Reservoir, Reelfoot Lake, and several smaller bodies of water. Important wildlife habitats occur at the Reelfoot National Wildlife Refuge, Hatchie National Wildlife Refuge, Tennessee National Migratory Wildlife Refuge, Gooch Waterfowl Management Area, and Tigrett Waterfowl Management Area..

There are several major sensitive sites close to the cotton fields in the program area. Appropriate protection measures for the resources of these natural areas will be considered by the program managers.

c. Potential Secondary Pest Outbreaks

Some concern was expressed in previous programs about the potential of the program treatments to increase the severity of outbreaks of secondary pests such as beet armyworm (which also feeds on cotton). Entomologists have noted that malathion is not effective on beet armyworm and believe it may temporarily reduce beneficial insects that may help control the pest. Evidence suggests that beet armyworm outbreaks are also related to climatological influences. However, these temporary outbreaks of secondary pests during eradication programs are generally of short duration and growers have found less need to treat for secondary pests in those states that have completed coordinated eradication programs (Virginia, North Carolina, South Carolina, Georgia, Florida, Arizona, California, and portions of Alabama, Tennessee, and Texas).

d. Environmental Justice Considerations

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. No disproportionate effects on such populations are anticipated as a consequence of implementing the preferred action with use of applicable program mitigative measures.

2. 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. Operational Procedures and Mitigation Measures

Comprehensive lists of routine operational procedures and mitigation measures that are followed in all areas of the National Cooperative Boll Weevil Control Program are provided in the EIS. Those procedures, found in tables 2-1 and 2-2 of the EIS, are reproduced here for easy reference. For this program, those procedures and measures should be adequate.

Table 2-1. Operational Procedures

All Methods of Control

1. All applicable Federal, State, and local environmental laws and regulations will be followed during boll weevil control operations.
2. Sensitive areas (water bodies; parks; and occupied dwellings, such as homes, schools, churches, hospitals, and recreation areas) that may be adjacent to cotton fields will be identified. The program will be adjusted accordingly to ensure that these areas are not negatively affected.
3. Environmental monitoring of the program will be in accordance with the current environmental monitoring plans.

4. All cotton fields in each program increment will be trapped, but only fields meeting the program criteria will be treated.
5. All program personnel will be instructed in the use of equipment and materials and on operational procedures. Field supervisors will emphasize operational procedures and monitor the conduct of personnel.

Aerial Applications

1. All materials will be applied in strict accordance with EPA- and State-approved label instructions.
2. Aircraft, dispersal equipment, and pilots that do not meet all contract requirements will not be allowed to operate.
3. All USDA, APHIS, Plant Protection and Quarantine employees who plan, supervise, recommend, or perform pesticide treatments must be certified under the APHIS pesticide certification plan. They also are required to know and meet any additional requirements of the State where they perform duties involving pesticide use.
4. Unprotected workers will be advised of the respective reentry periods following treatment. If azinphos-methyl is used, unprotected workers will not reenter the field for 24 hours; following a methyl parathion treatment, unprotected workers will not reenter the field for 48 hours.
5. Two-way radios will be provided to personnel who direct or coordinate field operations. Radio communication will be available to provide close coordination of all application operations.
6. All APHIS field personnel will have baseline cholinesterase tests before the first application and each spring and fall thereafter. It is recommended that contract, State, and private personnel also participate in this testing program.
7. Only certified aerial applicators who have been familiarized with local conditions will be used by the program.
8. To minimize drift and volatilization, applications will not be made when any of the following conditions exist in the spray area: wind velocity exceeding 10 miles per hour (or less if required by State law); rainfall or imminent rainfall; foggy weather; air turbulence that could seriously affect the normal spray pattern; or temperature inversions that could lead to offsite movement of spray.

9. Nozzle types and sizes, spray system pressure, and nozzle orientation will be specified in the program's aerial application contract or as otherwise directed by program personnel.

Ground Applications

1. Mist Blowers

Operators either will be certified applicators or will be in constant radio contact with certified applicators.

Units will be operated from closed truck cabs, with operators using recirculated air.

2. High-Clearance Machines

Operators either will be certified applicators or will be in constant radio contact with certified applicators.

Units will be operated from closed truck cabs, with operators using recirculated air.

Table 2-2. Recommended Mitigation Measures

All required State and local authorities will be notified upon initiation of the program. The notification will advise State and local authorities of the need for any assistance in identifying sensitive areas in proposed treatment areas.

Protection of Workers

All program personnel will be instructed on emergency procedures to follow in the event of insecticide exposure. Equipment necessary for immediate washing procedures must be available for application personnel.

Aerial Applications

1. Pilots, loaders, and other personnel handling insecticides will be advised to wear safety equipment and protective clothing.
2. Program personnel observing applications of malathion and azinphos-methyl or methyl parathion are required to wear protective clothing or remain inside a closed vehicle with recirculating air, depending on the circumstances of the application.

3. Application operations will be postponed in fields occupied by workers.
4. Flags or other markers will be used for pilot guidance in areas without natural landmarks.

Ground Applications

1. Mist Blowers

Units will be operated from closed cabs with operators using recirculated air.

Operators will wear appropriate safety equipment when loading or servicing the unit and will be specially trained by program personnel.

2. High-Clearance Machines

Operators *must* be certified applicators for methyl parathion applications, and they will exercise extreme caution when applying this material.*

Operators will wear appropriate safety equipment and protective clothing when loading, servicing, and operating the unit.

Pesticide Handling Precautions

1. To the degree possible, insecticides will be delivered and stored in sealed bulk tanks and then pumped directly into the aircraft.
2. All insecticides will be stored in accordance with Federal, State, and local regulations and label instructions.
3. All mixing, loading, and unloading of insecticides will be in an area where an accidental spill will not contaminate a stream or other body of water.
4. In the event of an accidental spill, procedures set forth in “PPQ Guidelines for Managing and Monitoring Pesticide Spills” (USDA-APHIS-M390.1402, 1983) will be followed.
5. All insecticide drums must be triple-rinsed before disposal. Rinse solutions may be used to prepare spray tank mixes or may be stored for subsequent disposal in accordance with label instructions. One of the following methods of drum disposal must be used:

! Require chemical companies, distributors, or suppliers to accept empty triple-rinsed drums.

! Transfer the empty triple-rinsed drums to State cooperators.

! Crush and/or puncture the empty triple-rinsed drums and dispose of as scrap metal.

Protection of the Public

1. Application aircraft shall avoid direct spraying of residences, garden plots, and adjacent crops at all times. Methyl parathion shall not be sprayed within 100 feet of a garden plot.

*The same precaution is recommended for new pesticides added since the publication of the final EIS.

2. Program personnel shall notify area residents not to consume fish from farm ponds located less than 50 feet from cotton fields treated with methyl parathion.
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 malathion, azinphos-methyl, or methyl parathion.*

Protection of Bees

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

Protection of Wildlife

1. All control operations will be conducted with appropriate concern for their potential impact on endangered, threatened, and proposed species identified in this document.

APHIS has prepared a biological assessment for federally listed endangered, threatened, and proposed species found within all U.S. cotton-producing counties from species information provided by the U.S. Department of the Interior, Fish and Wildlife Service (FWS).

Adequate protection measures are being developed for federally listed endangered, threatened, and proposed species through Endangered Species Act, section 7, formal consultations with FWS. Specific biological and distributional data for species will be gathered in discussions between APHIS Plant Protection and Quarantine (PPQ) and local FWS offices before operations begin. Species and habitats protected by State laws will be addressed in site-specific assessments as needed.

2. Oil- or water-sensitive dye cards will be used to regularly monitor application efficacy. Spray deposition in the target area and droplet size are critical concerns.

*The same precaution is recommended for new pesticides added since the publication of the final EIS.

D. Summary of Environmental Impacts

Program managers are very interested in a careful and objective analysis of the potential impacts which may result from the program's use of pesticides. Each of the pesticides that could be used in this program is acknowledged to present a degree of risk to humans, the physical environment, and nontarget species. (Impacts from the use of nonchemical alternatives were determined to be insignificant (even in the absence of protective measures or mitigation) and therefore are not considered in detail in this section.) The impacts from chemical pesticides may be direct, indirect, cumulative, or synergistic in nature. Such impacts may be incurred even if a nonchemical alternative is chosen, but fails for some reason, and a chemical alternative has to be employed. The impacts may overlap, may vary by site, and may be reduced substantially through the application of mitigation and protective measures.

Direct impacts that are likely to occur as a consequence of this program are believed to be considerably less than those that are possible if the program were not implemented. The principal reasons are that, in the absence of a program: (1) more toxic chemicals could be used by individual growers, (2) higher application rates could be used, (3) grower treatments could continue without abatement for many years, and (4) there would be no requirements for special protective measures. Minimal risk was determined for indirect toxic, systemic, reproductive, or cancer effects. Risks of cumulative impacts to human beings (systemic, reproductive, and cancer risks) were found to be minimal. Synergistic effects are reduced substantially through program operating procedures, including the requirement of safety equipment and reentry periods following treatments.

Consistent with Executive Order 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 minority populations and low-income populations. APHIS also recognizes that a proportion of the population may have unusual sensitivity to certain chemicals or environmental pollutants and that program treatments pose higher risks for these individuals. Special notification procedures and precautions, as stated in the EIS's recommended mitigations, are required and serve to minimize the risk for this group.

IV. Listing of Agencies and Persons Consulted

Gary Cunningham, Coordinator
National Boll Weevil Eradication Program
Plant Protection and Quarantine
Animal and Plant Health Inspection Service
U.S. Department of Agriculture
4700 River Road, Unit 138
Riverdale, MD 20737-1236

William Grefenstette, Senior Operations Officer
National Boll Weevil Eradication Program
Plant Protection and Quarantine
Animal and Plant Health Inspection Service
U.S. Department of Agriculture
4700 River Road, Unit 138
Riverdale, MD 20737-1236

Michael R. Hinton, Chief
Funds Management/Direct Loans Branch
Loan Making Division
Farm Service Agency
U.S. Department of Agriculture
1400 Independence Avenue, Mail Stop 0522
Washington, DC 20013

**Finding of No Significant Impact
for
Tennessee
Cooperative Boll Weevil Eradication Program
Environmental Assessment,
April 1998**

The U.S. Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), has prepared an environmental assessment (EA) for its participation in the National Boll Weevil Cooperative Control Program (boll weevil program) in the State of Tennessee. Because of the probability that the cooperating grower group may request a USDA Farm Service Agency (FSA) boll weevil eradication loan, FSA has cooperated with APHIS in the preparation of this EA. The EA, incorporated by reference into this document, is tiered to the "Final Environmental Impact Statement for the National Boll Weevil Cooperative Control Program--1991." The EA is available from:

*U.S. Department of Agriculture
Animal and Plant Health Inspection Service
Plant Protection and Quarantine
Southeastern Regional Office
3505 25th Avenue, Building 1
Gulfport, MS 39501*

The EA considered the impacts of alternatives and specific control methods for boll weevil eradication. Alternatives considered include limited no action, biological control, chemical control, cultural control, mechanical control, and sterile insect technique. APHIS program officials state that the proposed program is needed to (1) reduce agricultural losses caused by the boll weevil and allow local growers to remain economically competitive, (2) substantially reduce the amount of pesticides used by growers against the boll weevil and other pests, (3) maintain the biological integrity and efficacy of the national program to eradicate the boll weevil, (4) maintain the long-term biological diversity in and around cotton fields, and (5) comply with relevant pest control statutes and regulations.

APHIS is consulting with the U.S. Department of the Interior, Fish and Wildlife Service (FWS), with regard to the protection of endangered and threatened species or their critical habitats. APHIS will adhere to protective measures designed specifically for this program and mutually agreed upon with FWS.

I find that implementation of the proposed boll weevil eradication program in the State of Tennessee will not significantly impact the quality of the human environment.

I have considered and base my finding of no significant impact on quantitative and qualitative risk assessments of the proposed pesticides, review of the program's operational characteristics, and the site-specific aspects of the proposed program's area. 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 No. 12898. Lastly, because I have not found evidence of significant environmental impact associated with this program, I further find that an environmental impact statement does not need to be prepared and the program may proceed.

/S/
Jerry L. Fowler
Regional Director, Southeastern Regional Office
Plant Protection and Quarantine
Animal and Health Inspection Service

July 17, 1998
Date