EVALUATION OF THE PESTICIDE APPLICATOR CERTIFICATION, TRAINING, AND TESTING PROGRAM IN THE SOUTHEAST

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October 2005

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EXECUTIVE SUMMARY

Introduction and Background

The Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) grants the U.S. Environmental Protection Agency (EPA) the authority to determine who is allowed to apply certain risky pesticides. EPA limits application of such "restricted use" pesticides to applicators who have met specific certification requirements and those persons under their direct supervision. State Lead Agencies are an integral part of the process in making determinations of applicator competency; the United States Department of Agriculture's (USDA's) Cooperative Extension Service also contributes in certain states by conducting applicator training. However, EPA retains an integral role in helping states and USDA meet these responsibilities.

EPA and USDA, at the headquarters level, are parties to an interagency agreement that strives to effectively train pesticide applicators nationwide. EPA provides funding to USDA's Cooperative Extension Service, which then makes disbursements to each state's primary Land Grant University. USDA Extension Specialists (Extension Specialists) at the Land Grant Universities work with USDA Field Agents (Field Agents) to design training materials for restricted use pesticide applicators, prepare seminars, coordinate training activities, and in some instances administer pesticide applicator testing. State regulatory agencies receive EPA funding to administer pesticide applicator testing, certify and recertify qualified applicators, and review and accredit continuing education courses. EPA Region 4's Division of Air, Pesticides, and Toxics Management (EPA Region 4 or the Region) assumes a support role, helping others to ensure the quality and consistency of certification, training, and testing (CTT) across states.

This evaluation examines the effectiveness of the Program in training, testing, and certifying pesticide applicators in the Southeast to use pesticides in compliance with applicable laws and regulations. Specifically, the evaluation sought to answer the following questions:

- How successful has the pesticide CTT Program been in supporting state training efforts?
- What are the most successful aspects of pesticide applicator training, testing, and certification programs among EPA Region 4 states? Which aspects need improvement?
- How can EPA Region 4 states better measure performance and Program impact?

- Has the pesticide CTT Program helped states to train a broad base of pesticide applicators?
- Has the training helped applicators to pass state certification tests?
- How effective is the pesticide CTT Program in reducing violations?
- Is there potential to develop better outcome measures?

Based on the information collected during the evaluation, this report makes recommendations for future Program direction and enhancements.

Methodology

Using the logic model to help identify the Program's structure and expected success measures, IEc developed questions and conducted discussions with participants and stakeholders in the Program in order to provide answers to the evaluation's overarching questions. To assess the quality and availability of quantitative data, IEc examined data from EPA Region 4, USDA's Performance Planning and Reporting System (PPRS), North Carolina State University, and the Georgia Department of Agriculture on training participation, certification exam pass-fail rates, and violation rates. IEc intended to use these data to perform a quantitative evaluation of the impact of training on compliance among applicators. While the analysis did not yield conclusive statistical indicators, IEc formulated recommendations on the development of such performance measures in the future.

Recommendations for Program Improvement

Based on the information collected during the evaluation, IEc developed a set of recommendations for future Program direction and enhancements designed to improve the Program's cohesiveness, efficiency, and ability to quantify the benefits of its activities.

Recommendation 1: Address Partners' Funding Concerns

Program partners described substantial variations in annual Program funding as well as a recent downward trend in EPA disbursements. Further, partners felt that the lack of funding-related communication (i.e., with respect to the driving factors for funding decisions) served to increase frustration and compound the challenge of maintaining activity levels with fewer dollars.

EPA is unlikely to be able to fund the CTT Program to the degree desired by Extension Specialists and Field Agents. In addition the CTT Program's sensitivity to dynamic Federal budgetary priorities means that Extension Specialists are increasingly turning to outside funding sources (e.g., competitive grants from state departments of agriculture or programs like the USDA Hispanic Small Farm Project) to bridge budget gaps. Recognizing this fact, EPA and USDA might consider helping Program partners work through these budgetary challenges. For example, EPA could set up links from its website to fedgov.com, where all grants are currently listed.

Recommendation 2: Facilitate Sharing of Training Materials

EPA Region 4 states face similar tasks in educating specific applicator types to safely apply pesticides in accordance with Federal law. While there is currently extensive coordination within each state to develop and deliver training of a consistently high quality, there is relatively little collaboration among states in this respect. By virtue of their direct relationships with State Lead Agencies and Extension Specialists, EPA Region 4 staff are well positioned to take on an expanded role in leveraging states' efforts to minimize duplication of effort. EPA Region 4 could work with Headquarters to determine if information could be made available on the EPA Web site similar to the information maintained by Dr. Bob Bellinger at Clemson. That site helps South Carolina's Field Agents by organizing activities, disseminating news, and providing a unified set of materials.[1] In addition to centralizing training materials, the Web site could help to unify the Program's stakeholders. For example, by keeping partners informed of each other's work, the Web site might allow for more engagement on related or overlapping tasks. Alternatively, the Region could work with States to create State-specific Web sites. The Region could also consider the use of QuickPlace sites, which are ideal for sharing information among a limited audience.

Recommendation 3: Improve Program Communications

Program managers should strive to "flatten" the communication structure to facilitate open dialogue among partners. While not mandated to do so, Program partners generally communicate through a traditional "chain of command," with information and directives passing through intermediaries. As a result, partners are frequently unclear as to the goals of (and challenges faced by) other partners. This trend is particularly pronounced as it relates to communications between Cooperative Extension staff and Program managers at USDA headquarters. EPA's continuing efforts are demonstrated by its collaboration with USDA to "provide unified priorities, direction, guidance, and oversight" to the CTT program.[2]

EPA should consider expanding opportunities for interaction among Program partners. For example, a regional CTT coordination meeting could provide for the dialogue required to "air out" stakeholders' goals, challenges, and perspectives. While EPA Region 4's Atlanta offices are an obvious choice for the meeting site, EPA could also schedule the CTT meeting with another pesticide-related event (even if it were not in Atlanta) to facilitate the leveraging of limited travel dollars. While the meeting would certainly entail a time and dollar investment, its benefits (though difficult to quantify) could very well outweigh the costs. For instance, a CTT meeting would serve as an excellent opportunity to address partners' funding concerns (Recommendation 5.2.1) and facilitate materials sharing (Recommendation 5.2.2). With their funding concerns acknowledged and their grant-writing efforts supported, Extension Specialists would be positioned to secure grants that may allow them to improve participation in activities (e.g., tracking and reporting) now emphasized at the headquarters level. In addition, the

[1] See <http://entweb.clemson.edu/pesticid/> for more information.

[2] EPA's Office of Pesticide Programs. Strategic Program Assessment of the Pesticide Safety Education Program, p. 7. May 2005.

efficiencies created by expanded materials sharing could ease some of the Program's budgetary pressures. Most importantly, direct interaction among stakeholders will move the Program toward being the true "partnership" envisioned by EPA and USDA two decades ago.

Recommendation 4: Enhance Data Integration and Performance Measurement Capabilities

The basic data elements of the pesticide CTT Program -- comprising training, testing and violations -- provide a basic platform upon which EPA could potentially develop an outcome-based performance measurement system. With proper structure, such a centralized storehouse could be highly useful if made easily available to Program stakeholders. An applicator's social security number or license number could serve as the link between training participation, exam performance, and compliance behavior. Provided consistent data entry within and among EPA Region 4 states (e.g., by SSN or license number), EPA could identify testing and compliance trends as they vary among trained and untrained applicators.

The resulting outcomes would provide important benefits. To the extent that data show improved compliance among trained applicators, EPA may link its funding for the Program to decreases in pesticide-related risk to human health and the environment (i.e., as displayed in the Program's logic model). Data may also highlight areas for Program improvement. For example, pass/fail data may allow Extension Specialists to target resources (e.g., train-the-trainer funds) on those Field Agents most in need of attention. In addition, EPA could use violation data to formalize a Region-wide feedback loop (similar to the one employed in North Carolina) that provides for training courses to be continually responsive to trends in compliance and enforcement.

Recommendation 5: Conduct Research on Performance Measures and Training Utility

This evaluation has identified two areas for additional research. First, the pesticide CTT Program should consider conducting additional research to develop a methodology for linking training participation with compliance. Once a comprehensive tracking system has been developed, there will be methodological issues to address prior to developing the outcome measure. For instance, the timing of an applicator's training is critical. Many states require continuing education training for recertification, but few states stipulate when within the certification period an applicator must attend this training. As a result, training may occur in year one or year five of a certification term. If the violation occurs in year three, following training attendance in year one, the analysis must make an assumption as to whether this individual would be considered trained or untrained. For the purposes of the analysis conducted in Section 4.3.4, an applicator who participates in training in any year prior to the violation, whether it be one, two, or three years earlier, is identified as "trained." If one were to conduct a full-scale analysis, this assumption might be too simplistic. A more specific period following training participation could be designated as indicating a person was "trained."

USDA should also consider conducting additional research on the utility of applicator training. A survey of all applicators as to the best methods of reaching them as well as the reasons behind non-compliance would enable all CTT stakeholders to target scarce resources. This investigation could explore whether the reason for non-compliance is lack of information or

other motivations, such as efforts to save time. Finally, the survey could analyze responses by applicator type to determine the training preferences of private, commercial, and specialized applicators.

1.0 INTRODUCTION AND BACKGROUND

The Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) grants the U.S. Environmental Protection Agency (EPA) the authority to determine who is allowed to apply certain risky pesticides. EPA limits application of such "restricted use" pesticides to applicators who have met specific certification requirements and those persons under their direct supervision. State Lead Agencies are an integral part of the process in making determinations of applicator competency; the United States Department of Agriculture's (USDA's) Cooperative Extension Service also contributes in certain states by conducting applicator training. However, EPA retains an integral role in helping states and USDA meet these responsibilities.

EPA Region 4's Division of Air, Pesticides, and Toxics Management (EPA Region 4 or the Region) supports pesticide applicator certification, training, and testing (CTT) activities in the Southeast.[3] In partnership with USDA's Cooperative Extension Service and state pesticide regulatory agencies, EPA Region 4 provides limited oversight of the state pesticide training and certification programs, works with states to update state pesticide program plans, and acts as an intermediary between state stakeholders and federal agencies participating in the Certification, Training, and Testing Program (CTT Program or Program). EPA headquarters provides financial and other support to USDA and states, which (respectively) train and certify pesticide applicators in a variety of application categories (e.g., agricultural, right-of-way, turf/ornamental).

As part of its ongoing efforts to review the efficacy of its programs and those it supports, EPA contracted with Industrial Economics, Inc. (IEc) of Cambridge, Massachusetts to perform an evaluation of certain aspects of its pesticide applicator training and certification Program in the Southeast. EPA Region 4 received evaluation funding from EPA's Office of Planning, Analysis, and Accountability (OPAA) and Office of Policy, Economics, and Innovation (OPEI) through the "Improving Results Competition," an Agency-wide effort to competitively fund program evaluation. To oversee the evaluation, EPA established a workgroup comprising representatives from EPA Region 4 and OPEI. The workgroup includes Agency evaluation experts as well as EPA Region 4 staff actively involved in the management and implementation of pesticide applicator CTT activities in the Southeast.

EPA Region 4 was an ideal subject for this evaluation because:

[3] EPA Region 4 includes Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, and Tennessee.

- It has demonstrated a commitment to decreasing pesticide risk to workers and users of pesticides through training programs;

- It maintains a database of state-level inspection and enforcement data; and

- Its pesticide training programs have matured to their present state with little external evaluation.

Moreover, since other regions have similar training and certification programs (i.e., executed via partnerships with USDA and states), the results of this evaluation should be broadly transferable within the Agency.

This evaluation examines the effectiveness of the Program in training, testing, and certifying pesticide applicators in the Southeast to use pesticides in compliance with applicable laws and regulations. Specifically, the evaluation sought to answer the following questions:

- How successful has the pesticide CTT Program been in supporting state training efforts?

- What are the most successful aspects of pesticide applicator training, testing, and certification programs among EPA Region 4 states? Which aspects need improvement?

- How can EPA Region 4 states better measure performance and Program impact?

    - Has the pesticide CTT Program helped states to train a broad base of pesticide applicators?

    - Has the training helped applicators to pass state certification tests?

    - How effective is the pesticide CTT Program in reducing violations?

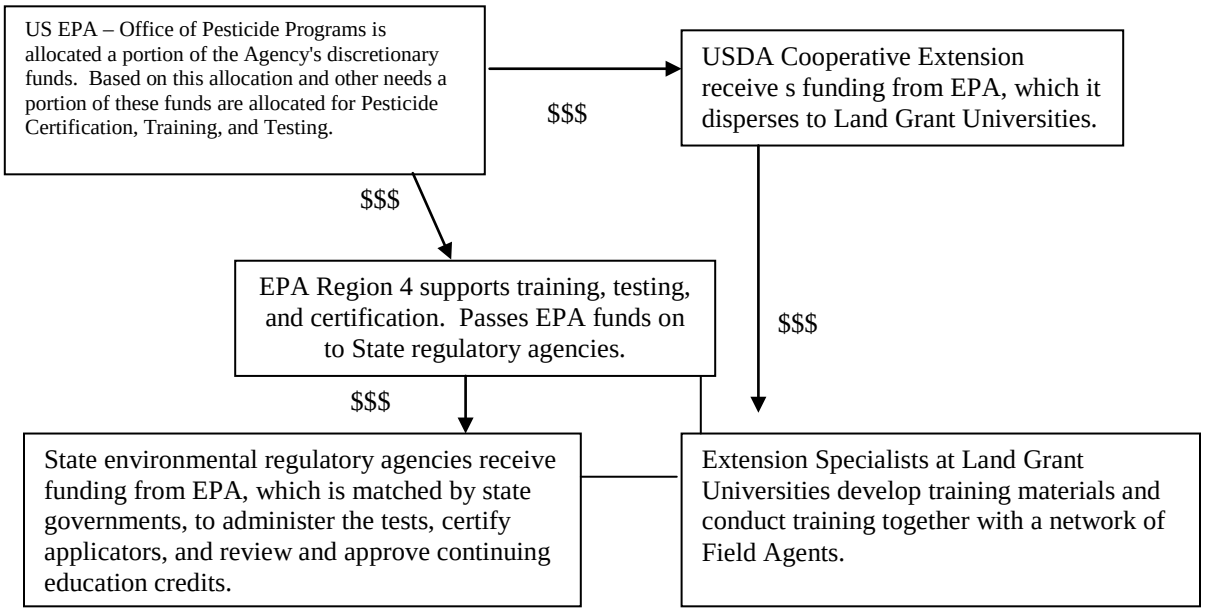
    - Is there potential to develop better outcome measures?

Based on the information collected during the evaluation, this report makes recommendations for future Program direction and enhancements.

2.0 PROGRAM OVERVIEW

EPA Region 4's efforts are part of a broader multi-agency process involving EPA, USDA, and state governments (See Figure 1). EPA and USDA, at the headquarters level, are parties to an interagency agreement that strives to effectively train pesticide applicators nationwide. EPA provides funding to USDA's Cooperative Extension Service, which then makes disbursements to each state's primary Land Grant University. USDA Extension Specialists (Extension Specialists) at the Land Grant Universities work with USDA Field Agents (Field Agents) to design training materials for restricted use pesticide applicators, prepare seminars, coordinate training activities, and in some instances administer pesticide applicator testing. State regulatory agencies receive EPA funding to administer pesticide applicator testing, certify and recertify qualified applicators, and review and accredit continuing education courses. EPA regional offices assume a support role, helping others to ensure the quality and consistency of training, testing, and certification across states. The following sections provide detail on stakeholder responsibilities, state training and certification requirements, Program funding, and Program goals.

Figure 1. Multi-Agency Certification and Training Program Structure



2.1 Roles and Responsibilities of Program Partners

The pesticide certification, training, and testing Program is supported by offices and individuals on the federal, regional, state, and local levels. This section discusses the roles and responsibilities of each stakeholder in the pesticide CTT Program: EPA headquarters, USDA headquarters, EPA Region 4, Extension Specialists, Field Agents, and State Lead Agencies.

- The **Office of Pesticide Programs (OPP) at EPA headquarters** establishes the national standards for pesticide use, which lay the foundation for the certification program. More specifically, EPA oversees the national pesticide CTT Program, providing funds through USDA to the State Cooperative Extension Services and also directly to the State Lead Agencies and offering guidance to partners (e.g., regarding worker protection). EPA is developing a core manual for use nationwide and a national core exam, which it is working to implement across states. OPP has also established a national network of representatives from EPA, USDA, State Lead Agencies, and pesticide applicator associations, called the Certification and Training Assessment Group (CTAG), which offers a forum for discussion about important certification and training issues.

- Through an interagency agreement, **USDA** distributes funds, provided by EPA, to state Land Grant Universities. Statutory restrictions prevent Land Grant Universities from charging overhead to USDA. Without a similar agreement, were EPA to give directly to the Land Grant Universities, these allocations might be reduced by as much as 50 percent of the annual certification, training, and testing dollars for overhead. USDA has only contributed funding to the Program in 2003.

  USDA itself has a limited role in the design and delivery of training at the local level. However, some of the tools available to the State Cooperative Extension Services assist in this delivery. For example, USDA maintains the Performance Planning and Reporting System (PPRS), an online portal for the annual progress reports and "plans of work" the Extension Specialists are required to submit. These reports provide a review and forecast, respectively, of the dynamics of the state pesticide safety education program. Each state provides a detailed account of its funding by source, of the number of full-time equivalents supporting the program, and of the number of applicators participating in training activities, in total, by applicator category, and for certification, re-certification, and non-certification training.[4] In addition, the reports provide the results of surveys administered to applicators following the training, which ask about their intention to apply the information learned in the session. Finally, states report on the number of printed materials and electronic media available to pesticide applicators.

[4] Non-certification training is education provided to members of the general public on the safe use and application of "over the counter" pesticides.

- **EPA Region 4** is responsible for oversight of the pesticide CTT Program in the eight states that comprise this region. The regional office provides guidance related to federal requirements and interacts with State Lead Agencies concerning training and testing content. Program Officers from EPA Region 4 serve as the primary point of contact for states, ensuring that these states are meeting reporting and regulatory requirements.

- **Extension Specialists** receive some direction from USDA headquarters and, in an informal capacity, from EPA. Using the statutory requirements for the certification of restricted-use pesticide applicators as their guide, Extension Specialists design training materials for private and commercial applicators and coordinate their dissemination to Field Agents throughout the state. To varying degrees in each state, Extension Specialists are also involved in the design and administration of certification exams. These responsibilities relate to the testing and certification of both private and commercial applicators.[5] In some states, Extension Specialists also conduct training for certain commercial applicator categories and work with the State Lead Agency to determine the number of credits awarded for continuing education course work.

- **Field Agents** are responsible for training private applicators and certain categories of commercial applicators. In some states, Field Agents also coordinate training-related outreach efforts (e.g., newspaper notices) and administer certification exams. Field Agents work closely with Extension Specialists.

- **State Lead Agencies** are responsible for developing and administering certification exams as well as issuing licenses. In addition, they review all proposed continuing education courses and track continuing education credits accrued by applicators seeking to maintain their certification. Finally, the State Lead Agencies are responsible for enforcement activities and for tracking violations by applicators.

The Extension Specialists, Field Agents, and State Lead Agencies are responsible for supporting the needs of 191,474 applicators (2003) in EPA Region 4. The total number of applicators in each EPA Region 4 state varies considerably, ranging from almost 12,000 in Florida to 45,000 in Kentucky in 2003 (see Table 1).

[5] Private applicators are individuals, typically farmers, who obtain a license in order to apply pesticides on their property. Commercial applicators are pesticide application service providers, who are paid for their professional services.

Table 1. Certified Pesticide Applicators By State

State	2000	2001	2002	2003
Alabama	11,021	13,816	12,070	12,131
Florida	11,371	21,129	19,141	11,745
Georgia	29,803	27,069	27,424	29,742
Kentucky	43,998	43,998	48,033	44,608
Mississippi	27,630	17,648	16,989	4,011
North Carolina	42,262	41,901	45,323	35,790
South Carolina	11,509	12,044	12,375	12,669
Tennessee	33,044	34,558	37,639	40,778
Total	210,638	212,163	218,994	191,474

Source: EPA Region 4 Certification and Training Database, 2005. (http://www.epa.gov/oppfead1/safety/applicators/data.htm)

Note: This data was compiled by EPA's Certification & Worker Protection Branch (CWPB), which collects the information directly from the states. We note significant annual fluctuations in the number of certified applicators in several states. The variation in recertification periods (from 1 year to 5 years) may affect the total number of certified applicators in any given year and cause the annual variation exhibited by the data. (Source: Personal Communication with Elizabeth Owens, CWPB staff)

2.2 Training, Testing, and Certification Requirements

While no state in EPA Region 4 requires that an applicator complete training before sitting for a certification exam, all states offer this training. Tennessee is the only EPA Region 4 state that does not require private applicators to take a licensing examination; applicators are certified upon completion of a full-day training. Appendix A illustrates training, testing, and certification requirements across EPA Region 4 states, as described by individuals interviewed as a part of this evaluation.

EPA Region 4 states certify applicators for term lengths varying between one and five years. Alabama and Mississippi are the only EPA Region 4 states to require a re-certification examination—Alabama every year and Mississippi every five years—for private applicators. Applicators in other states can maintain their certification (and re-certify) through continuing education without taking another test. Several states also give applicators the option to take a re-certification exam, though the vast majority of applicators choose continuing education. Course options and credit requirements vary by applicator type (i.e., private vs. the many commercial categories). Some states have passed laws to prevent applicators from delaying their training while continuing to professionally apply pesticides (e.g., North Carolina requires commercial applicators to spread their credits over three years of the five-year certification term).

2.3 Funding Mechanisms and Sources

Established pursuant to FIFRA Section 23, the EPA-USDA interagency agreement serves as the basis to pass funds through USDA to support applicator training. While neither FIFRA nor the interagency agreement specifies the level of annual disbursement, EPA historically has served as the program's lone Federal benefactor. EPA's funding for the pesticide CTT Program flows to Extension Specialists and the State Lead Agencies through USDA headquarters and

EPA Region 4 respectively. Money provided by EPA to the State Lead Agencies is matched by each state's lead regulatory agency and by its cooperative extension service. With significant variation across states, Extension Specialists also receive funds from the state and/or EPA Region 4; however, these funds are targeted to specific projects. EPA funds are earmarked for the pesticide applicator training, and can be used for a broad range of related costs. Extension Specialists generally receive between $20,000 and $40,000 annually from EPA for training activities, but these amounts vary considerably depending on EPA's annual budget circumstances and the number of applicators in each State. Differences in disbursements among states within a given year reflect the USDA's discretion over fund allocation (i.e., USDA's funding formula takes into account the number of trained and certified applicators in each state for each year). EPA provides program funding to USDA as a lump sum and USDA headquarters determines how it will be allocated among the states in EPA Region 4. Extension Specialists determine allocation amounts among their Field Agents.

2.4 Program Goals and Strategic Objectives

According to program participants, the long term goal of the pesticide CTT Program is to minimize pesticide-related risk to human health and the environment, primarily through education and training.[6] However, stakeholders bring differing perspectives on how best to achieve this goal. Extension Specialists and Field Agents stress the importance of helping applicators (a) understand what is required of them under applicable laws and regulations; and (b) appreciate the notion of "timely and judicious" pesticide use as a final option after other pest management methods have been exhausted. Similarly, State Lead Agency staff are interested in providing good service to their "customers," whom they identified as the applicators as well as the residents of the state. One State Lead Agency staff member said that his Agency strives to ensure a base of well-trained applicators sufficient to meet demand for pesticide services in the state. While EPA has the same goals as those noted by its partners, the Agency sees education as one mechanism through which to achieve reductions in risk to human health and the environment. EPA also notes the necessity of enforcement in ensuring compliance and reducing risks.

To illustrate the different components of the pesticide applicator training, testing, and certification efforts in the Southeast that work towards reducing risks to human health and the environment, IEc developed a logic model (i.e., a graphical representation of the relationships between Program inputs, outputs, and intended outcomes), included below as Figure 2. Key components include the following:

- The **Mission** defines the overarching aims of Program efforts. It sets the broad principles that guide the program, and serves as the overarching criterion against which Program accomplishments can be evaluated. Ideally, each component of training, testing, and certification efforts should be consistent with the Mission.

[6] This discussion of program objectives reflects the responses of EPA headquarters, USDA headquarters, EPA Region 4, Extension Specialists, and State Lead Agency staff during our evaluation interviews to questions about program goals.

- **Inputs** are the investments (e.g., in time and funding) required to support the activities associated with Program efforts.

- **Activities/Outputs** are the specific actions taken to achieve the Program's mission and the immediate products that result. Under the training, testing, and certification efforts in the Southeast, these products include state training courses (and trained applicators), testing and certification programs (and appropriately certified applicators), and regional oversight to ensure quality and consistency across states.

- **Customers** are the users of the outputs, products, or services developed. They are the target audience EPA Region 4 aims to reach (e.g., pesticide applicators and the general public).

- **Short-Term Outcomes** are changes in learning, attitudes, skills, knowledge, and/or awareness resulting from Program outputs. In this case, training helps pesticide applicators understand key concepts and motivates them to properly apply pesticides.

- **Intermediate Outcomes** are the intended changes in pesticide applicator behavior that are causally linked to Program efforts. For example, trained applicators may employ learned practices and less frequently misuse or misapply pesticides.

- **Long-Term Environmental Outcomes** parallel the overarching goals of Program efforts, and are the environmental and human health benefits that the program partners anticipate will flow from training and its associated behavioral changes.

- **Partners** include those entities administering, supporting, and participating in training, testing, and certification efforts.

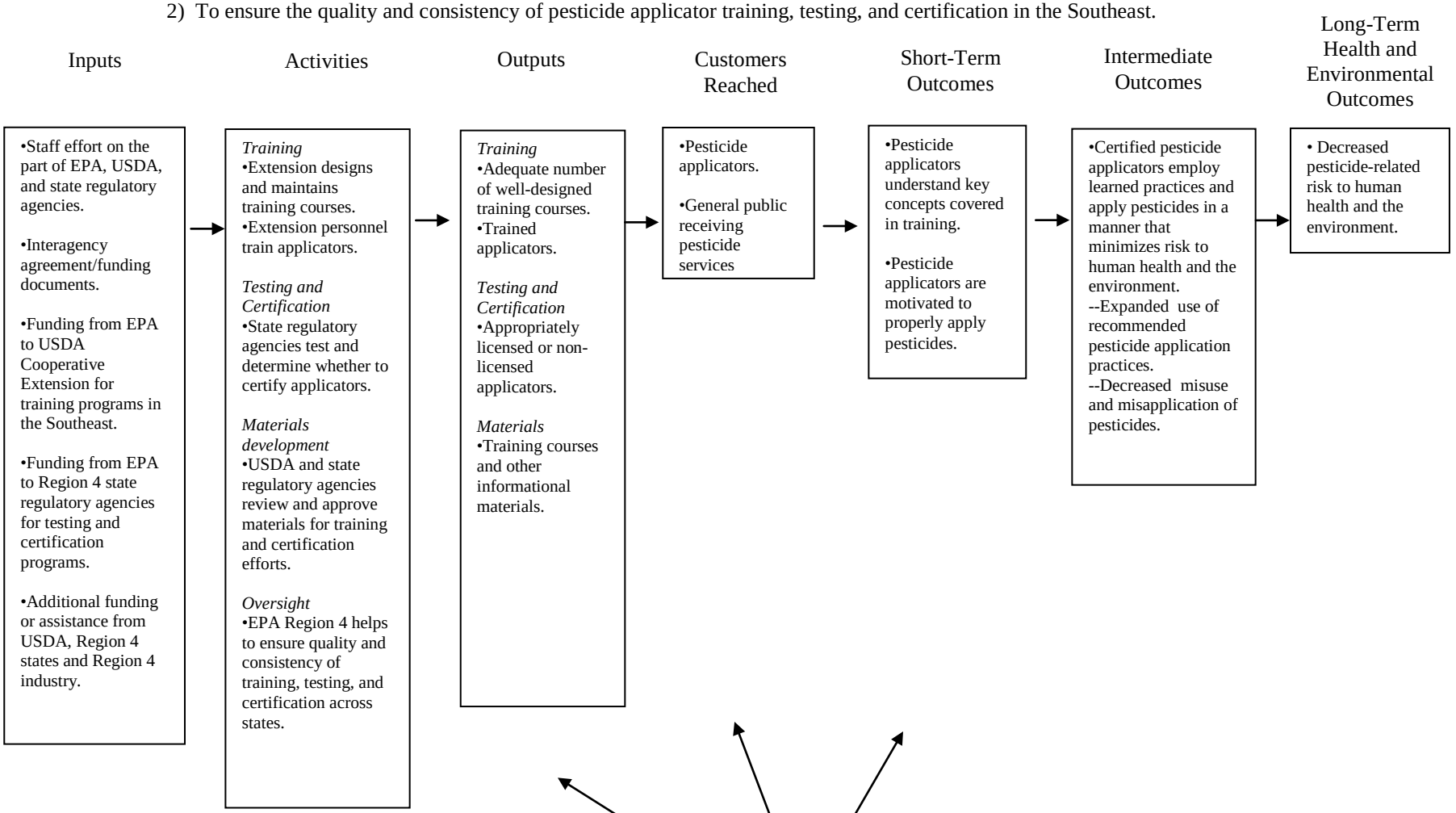
- **Contextual/External Variables** are factors not directly controlled by Program partners that may affect Program performance (e.g., funding modifications or changes in economic conditions).

IEc used the logic model to formulate its approach to this evaluation. The examination of the Program's mission, inputs, activities, and customers within this framework facilitated the development of key discussion questions. The identification of key outputs and outcomes of Program activities offered a framework within which to address performance measurement.

Figure 2: Logic Model of Training, Testing, and Certification of Pesticide Applicators in the Southeast

Mission: 1) To decrease pesticide risk to workers and users of pesticides.

2) To ensure the quality and consistency of pesticide applicator training, testing, and certification in the Southeast.



3.0 METHODOLOGY

Using the logic model to help identify the Program's structure and expected success measures, IEc developed questions and conducted discussions with participants and stakeholders in the Program in order to provide answers to the evaluation's overarching questions. To assess the quality and availability of quantitative data, IEc examined data from EPA Region 4, USDA's Performance Planning and Reporting System (PPRS), North Carolina State University, and the Georgia Department of Agriculture on training participation, certification exam pass-fail rates, and violation rates. IEc intended to use these data to perform a quantitative evaluation of the impact of training on compliance among applicators. While the analysis did not yield conclusive statistical indicators, IEc formulated recommendations on the development of such performance measures in the future. IEc combined the results of these analyses to develop a comprehensive assessment of efforts in training, testing, and certifying pesticide applicators in the Southeast. Appendix B presents the Quality Assurance Plan developed in conjunction with this evaluation methodology.

3.1 Qualitative Analysis: Participant and Stakeholder Discussions

During February and March 2005, IEc conducted one-hour discussions with EPA and USDA headquarters staff; EPA Region 4 staff; USDA Cooperative Extension Specialists and Field Agents; and State Lead Agency staff. The stakeholder discussions allowed multiple perspectives to frame the conclusions of this analysis and shape the evaluation's recommendations (see Table 2). Appendix C lists the names and affiliations of each interviewee.

Table 2. Stakeholder Groups for Evaluation

Stakeholder Group	Number of Interviewees
EPA/OPP Headquarters Staff	3
USDA Headquarters Staff	1
EPA Region 4 Staff	4
USDA Cooperative Extension Specialists	8
USDA Cooperative Extension Field Agents	5
State Lead Regulatory Agency Staff	11
Total Discussions	32

Discussions covered a range of topics across stakeholder groups to reveal the roles and responsibilities of the agencies involved in the Program as well as the success of the Program in addressing its strategic objectives. Discussions with EPA and USDA headquarters staff focused on strategic and "big picture" issues, while discussions with EPA Region 4 staff and USDA Cooperative Extension Specialists targeted interstate and strategic issues. USDA Cooperative Extension Field Agents and State Lead Agency staff discussions focused on state-specific issues. All stakeholder groups were asked about communication among the various parties and the Program's success at achieving desired outputs and outcomes and the effectiveness of the current measurement activities. Appendix D presents the discussion guides used during this evaluation.

3.1.1 Discussion Logistics

EPA made initial contact with the stakeholders through an introductory e-mail that explained the purpose of the evaluation and requested each respondent's assistance. This email was sent from an official EPA account to assure participants of the authenticity of IEc's efforts. The e-mail emphasized that written responses were not necessary and that IEc would provide the discussion questions upon scheduling the interview to streamline the discussions and give respondents time to gather information from colleagues (as necessary).

A week after the initial correspondence, IEc contacted interviewees to schedule discussions. We conducted the majority of discussions by telephone, though we facilitated a series of interviews in person. During a trip to EPA Region 4 states, site visits to USDA Cooperative Extension Service offices in Athens, Georgia and Clemson, South Carolina (University of Georgia and Clemson University, respectively) allowed for on-site assessments of specific Program objectives and accomplishments. IEc also conducted in-person discussions with Troy Pierce (of EPA Region 4) and two officials from Georgia's Department of Agriculture (i.e., State Lead Agency). To allow for brainstorming among Program managers, IEc attempted to conduct group discussions with EPA and USDA headquarters as well as EPA Region 4. However due to scheduling considerations, EPA Region 4 participants and one EPA headquarters manager were interviewed separately.

3.2 Performance Measurement

IEc attempted to determine the impact of training using stakeholder discussions and data from EPA Region 4, North Carolina State University, Georgia Department of Agriculture, and USDA's Performance Planning and Reporting System (PPRS). Our analysis focused on whether training participation improved test results and/or reduced the tendency of applicators to commit violations. Specifically, IEc sought answers to the following questions:

- Relative to untrained applicators, are trained applicators more or less successful in taking state certification examinations?

- Relative to untrained applicators, are trained applicators more or less likely to be cited for violations?

These data sources helped identify and frame performance measures for the Program in terms of violations, exam performance, and training (see Table 3), but were found to be an insufficient basis for a rigorous quantitative assessment of this Program's performance.

Table 3. Performance Measurement Data Used in Evaluation

Data Type	Data Source	Comments
Violations	EPA Region 4	In deference to the Region's concerns about variations in data quality and data completeness, IEc limited our violation analysis to North Carolina. However even these data were inconsistent in their attribution of violations (e.g., to applicators versus responsible parties) as well as their use of the license number as a standard identifier.
Exam Results	North Carolina State University Georgia Department of Agriculture	EPA Region 4 noted that few states maintain (and upload to the Region's database) comprehensive data on certification exam pass/fail rates. In coordination with the Region, IEc obtained data for North Carolina and Georgia.
Training	North Carolina State University Georgia Department of Agriculture	As with certification exam data, training data are unreliable in most EPA Region 4 states. IEc limited our training analysis to North Carolina and Georgia.
	USDA's Performance Planning and Reporting System (PPRS)	PPRS data describe training's effect on the adoption of learned pesticide management practices. IEc employed these data for Alabama, Florida, Georgia, Mississippi, South Carolina, and Tennessee. (Kentucky and North Carolina do not report this data.)

3.2.1 Training and Testing

In addition to asking respondents to provide their opinions about how training participation affects test performance, IEc obtained test performance results from the Georgia Department of Agriculture and North Carolina State University (the state Land Grant University). The Georgia data series reflected the universe of commercial applicators who took the commercial applicator exam in 2003 and 2004. This information was broken down by commercial applicators participating in one of five training sessions in these years (trained) and commercial applicators not participating (untrained). While the test score was not available for each applicator, the number of applicators who passed versus those who failed was provided by training session and in aggregate for the untrained test takers in each year. Our analysis compared the pass rates of the total number of trained applicators to the total number of untrained applicators in each year (See Section 4.3).

Over the course of 2003 and 2004, Bob Mckracken, the Coordinator of the Southern Region Pesticide Safety Education Center at North Carolina State University, recorded the exam performance of test takers at several training and examination sessions. Mr. Mckracken provided IEc with data he had collected from ten training and testing sessions. Data from the entire universe of applicators taking exams in these years was not available. However, this sample included the number of trained test takers by applicator category, the percent within this group that passed the exam (pass rate), the pass rates of all applicators taking the exam at a particular session, and the total number of test takers by session from a subset of sessions offered

during the course of these years. These training sessions allowed applicators who did not want to participate in the training to take the exam, which was administered to trained and untrained applicators at the end of the day. By session and in aggregate, we compared the performance of trained versus untrained applicators on the exam. Due to the small sample sizes from a given session, we present and draw conclusions based only on the aggregate data.

3.2.2 Training and Violations

In order to assess the relationship between applicator training and violations rates, we leveraged data from a number of sources. First, we reviewed the responses of our interviewees to a question that targeted this issue. Respondents were asked if they believed that training reduced violation rates. Second, we assessed the survey data presented in the PPRS surveys that ask applicators whether or not they intend to adopt practices learned during the training. This survey also follows up with applicators after the training to ask whether or not they did in fact adopt learned practices. Although not all EPA Region 4 states report this information, we present data from six states. IEc's conclusions regarding trends in the PPRS data should be viewed in light of several caveats regarding the methods used to conduct the PPRS survey (see Section 4.3.3).

Third, we asked for violation data by applicator license number for all EPA Region 4 states. Due to concerns about data quality, IEc decided to focus our analysis on North Carolina, which had the most comprehensive violation data among EPA Region 4 states. EPA Region 4 provided us with an Excel spreadsheet which provided details of each violation recorded between 2000 and 2004 by license number. For the most part, this data was comprehensive. We eliminated records for which the data was insufficient and focused on a sample of 338 records. We cross referenced the license numbers from this sample with the training participation data obtained from North Carolina Department of Agriculture and Consumer Services' online tracking database.[7] This data source provided us with the date each applicator participated in recertification training. By comparing the date of training to the date of the violation, we determined which applicators in our sample had been trained prior to receiving a violation and which received training after the violation was issued. While the goal of this exercise was to determine the relationship between training and violations, the data proved insufficient for a rigorous correlation study. Although we were not able to present concrete conclusions on the impact of training on violation rates, we were able to assess the available data and the capacity to link these two elements. We make recommendations for how such an analysis might be possible given improvements in data quality.

[7] This database can be accessed at the following address and provides information by applicator number and name about continuing education activities. http://www.ncagr.com/aspzine/fooddrug/Recert/RTsearch.asp.

4.0 RESULTS

This section presents the results of the evaluation interviews and performance measurement analysis. Discussion results are quantified where supported by available data (e.g., changes in funding levels and the number of trained applicators). Because discussion data yielded few quantitative measures, IEc made subjective assessments to synthesize cross-cutting conclusions within and among the stakeholder groups responding. We used the findings from our quantitative assessment to determine how the current measurement indicators could be enhanced and better integrated to develop a more outcome-oriented measurement system.

The following sections present the evaluation results as they relate to the evaluation's three overarching questions, which are in italics at the start of each section. Appendix E presents a detailed findings table organized by these overarching evaluation questions.

4.1 Program Support of State Training Efforts

How successful has the pesticide CTT Program been in supporting state training efforts?

The CTT Program serves three important functions in supporting states in certifying, training, and testing pesticide applicators: funding, communication, and alignment of goals.

4.1.1 Funding

EPA has historically served as an important funding entity for the CTT Program, providing millions of dollars over the past 20 years.[8] The following sub-sections detail the logistics of the disbursement process as well as respondents' views on the sufficiency of Program funds.

4.1.1.1 Logistics

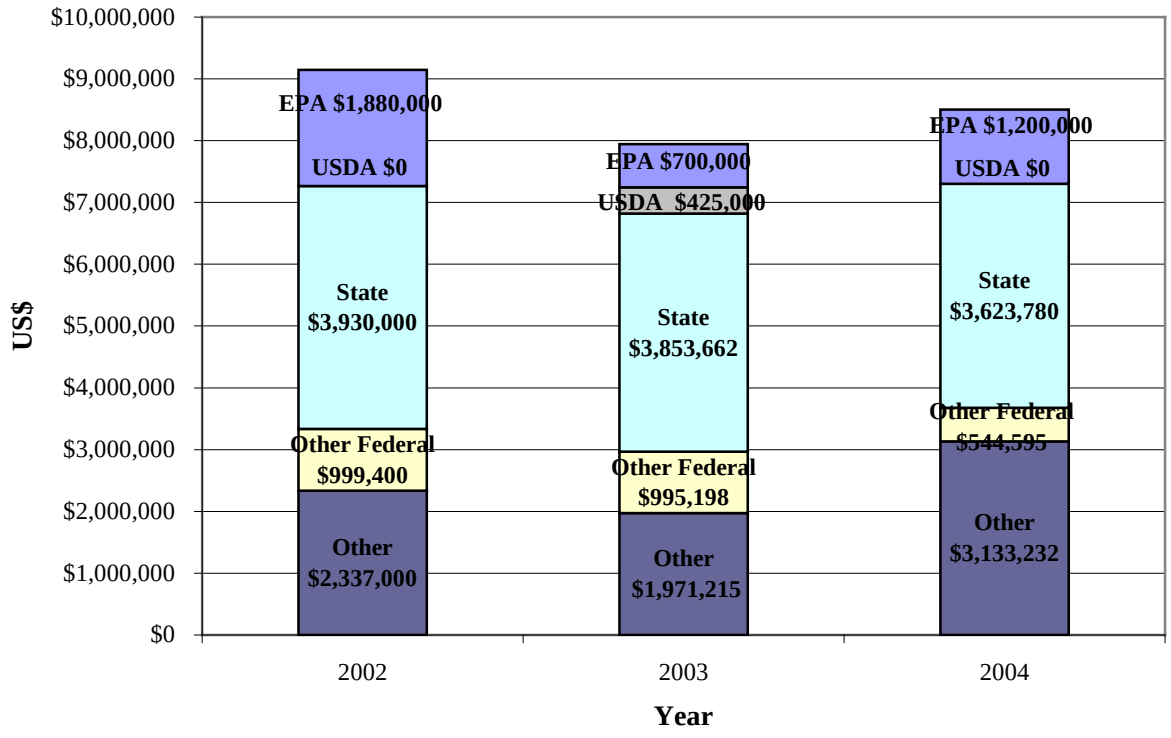
EPA routes Program funds through USDA, which uses a funding formula to determine the disbursement amounts for each EPA Region 4 state. USDA passes funds to Extension

[8] This estimate includes funds provided to states through USDA as well as to State Lead Agencies through Region 4.

Specialists through each state's Land Grant University system,[9] using statutory restrictions on allowable overhead costs to maximize each dollar's utility. Specialists, in turn, determine allocation amounts among their Field Agents. Extension Specialists generally receive between $20,000-$40,000 annually from EPA. In addition to employing EPA grants, Extension Specialists identify and tap alternate funding sources (e.g., fees from workbooks and course registrations; other Federal grant programs). States also contribute funding for the training, testing, and certification of applicators (See Figure 3).

Relative to Extension Specialists, State Lead Agencies receive more of EPA's certification-related funding. For example, one state's structural pesticide program estimates annual funding at about one FTE (roughly $80k), while another state's agricultural program estimates $150k annually. The state matches some or all of each federal dollar disbursed for certification activities.

Figure 3
National Training Program Funding by Source, 2002 to 2004



Source: USDA's Performance Planning and Reporting System, 2005.
Note: Other Federal funding includes EPA and USDA grant money (either provided directly or through the State Lead Agencies) as well as a portion of integrated pest management money. The Other category includes contributions to Field Agent salaries by the counties they serve (several states include this financing with State funds). In several states, testing or training fees are collected. This money is reflected in the state funding category.

[9] One Extension Specialist suggested that official budget notifications should go to Specialists in addition to university budget offices so that specialists are aware of and able to use all funding available.

As a result of broadly-written grant requirements, recipients retain substantial discretion to combine grant dollars into a single "pot" and employ funds for their most pressing needs. Extension Specialists use grant money to fund their salaries and those of Field Agents and support staff; these partners develop, deliver, and revise training across each state. State Lead Agencies fund FTEs, in accordance with approved state plans, to develop and administer applicator examinations and manage the certification and re-certification processes.

4.1.1.2 Sufficiency

USDA Extension Specialists and Field Agents claim that federal funds are currently insufficient to prepare and deliver quality training. As illustrated by Table 1, federal funding has fluctuated substantially over the 2002-2004 period. From 2002-2003, EPA's funding diminished by over $1 million. From 2003-2004, EPA's funding increased by $500,000, but was still less than two thirds of 2002 levels.[10] USDA's 2003 contribution of $425,000 was the Department's only contribution in the 30 year history of the program; USDA did not contribute funding in 2004. The States assert that these fluctuations hinder the ability of Extension Specialists to plan Program-related activities. The training program's solvency has been preserved by the consistent (and relatively large) contributions of states. Over the 2002-2004 period, states have (in aggregate) contributed more than EPA and USDA combined.

4.1.2 Communication

Program communications are critical in laying the groundwork for all aspects of applicator certification, training, and testing. This section discusses Program communications in terms of their frequency, content, and quality. The section closes with a brief discussion of the barriers to effective Program communication.

4.1.2.1 Frequency and Content

Partners communicate most frequently with Extension Specialists, Field Agents, and State Lead Agency staff, and least frequently with headquarters and regional staff (see Table 4).

[10] EPA noted that the 2002-2004 fluctuations fall within historical bounds; the program's EPA funding has ranged from $700,000 to $2 million over a 30 year period. EPA also emphasized the key issue driving fluctuations in the Program's funding: because the funding comes from EPA's discretionary budget, it is subject to year-to-year variations in Congressional allocations. Training funds suffer particularly because regulations mandating certification do not also require training and thus are not accompanied by training funds.

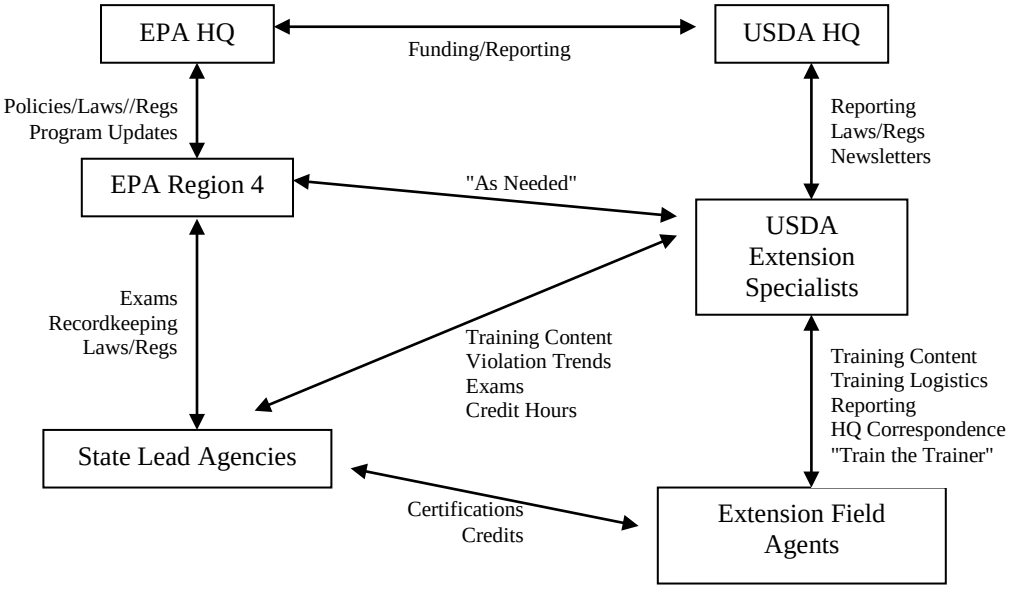
Table 4. Respondents' Characterization of the Frequency of their Communication with Partners

	Stakeholder Group Communicated With					
Frequency	EPA HQ	USDA HQ	EPA Region 4	Extension Specialists	Field Agents	State Lead
Daily	1	0	0	2	8	4
Several Times a Week	1	0	1	4	2	4
Weekly	1	1	1	6	5	0
Several Times a Month	2	2	3	1	1	6
Monthly	4	3	5	5	1	1
Rarely	14	15	10	2	3	3
Never	3	8	4	2	6	0
Other	2	0	2	0	0	0
Total Respondents	28	29	26	22	26	18

Note: Tallies indicate the number of interviewees who described their communication with each stakeholder group at a given frequency. The "total respondents" tally differs according to variations in the number of interviewees discussing their communication with each group. For example, 28 interviewees discussed their level of communication with EPA headquarters. "Other" responses included periodic "as needed" conversations and quarterly meetings.

Communications are driven, to some extent, by adherence to a hierarchical command structure: directives and information are relayed through intermediaries (i.e., EPA Region 4 and Extension Specialists) before arriving at implementers (i.e., Field Agents and State Lead Agencies) or decision-makers (i.e., EPA and USDA headquarters). Figure 4 displays the "silo" structure of these communication patterns as well as the topics commonly discussed by stakeholders. Note that the figure represents only the most frequent communications; certain (though infrequent) communications occur outside of this model.

Figure 4. Model Program Communication Flows



As displayed above, headquarters-level partners communicate with each other and with their most immediate partners, but rarely communicate directly with Program implementers. Extension Specialists are a "hub" of information transfer, serving as an important router within USDA, across agencies, and with states.

4.1.2.2 Quality

Most stakeholders indicated that they "communicate well" with their partners and have similar views with respect to the Program's goals; respondents noted "difficult" communications to a very limited extent (see Table 5).

Table 5. Respondents' Characterization of the Quality of their Communication with Partners

	Stakeholder Group Communicated With					
Communication Quality Descriptor (As employed during discussions)	EPA HQ	USDA HQ	Region 4	Ext. Spec.	Field Agents	State Lead
We communicate well. They understand the Program, its goals, and its needs.	7	6	6	10	16	12
We communicate fairly well, but our priorities differ (e.g., I'm focused on violations and my counterparts are concerned with the number of applicators trained).	4	2	6	6	4	4
Communication is difficult; they are out of sync with Program goals and needs.	1	1	1	1	0	0
I do not have direct contact with this partner. My comments or thoughts are routed through other partners.	6	4	3	0	0	0
Total Respondents	18	13	16	17	20	16

Note: Tallies indicate the number of interviewees who described their communication with each stakeholder group at a given "quality" level. The "total respondents" tally differs according to variations in the number of interviewees communicating with each group. For example, 13 interviewees have some contact with USDA headquarters; 20 interviewees have some contact with Field Agents. These "total respondents" tallies differ from those presented in Table 5 because many respondents who "rarely" or "never" communicate with a specific stakeholder group declined to describe the quality of their communication with that group.

Stakeholders spoke of effective communications with Extension Specialists, Field Agents, and State Lead Agency staff in particular. Given the relatively high frequency of communications among Extension Specialists, Field Agents, and State Lead Agencies, these partners may be more likely to "communicate well" with each other. In addition, the Program's somewhat hierarchical command structure (see Figure 4) may have influenced the number of partners claiming only indirect contact with EPA and USDA headquarters.

4.1.2.3 Barriers to Effective Communication

Respondents most frequently cited (in nine of 30 cases) time constraints as the Program's most important barrier to communication between stakeholders. Partners invest such substantial effort in conducting Program-related activities that it cuts into the time they are able to dedicate to communicating about those activities. However, eight (of 30) interviewees noted "no significant barriers" to communication. Respondents citing "other" barriers described issues such as personality conflicts; interagency politics (e.g., USDA complains of decreased EPA funding, EPA notes that USDA has only recently contributed funding); lack of travel (i.e., lack

of in-person meeting time); and different concepts of Program goals (e.g., USDA headquarters' focus on reporting vs. Cooperative Extension's focus on the "nuts and bolts" of developing, delivering, and revising training).

Among the 18 (of 30) respondents who felt that increased communication would help improve the Program, the pervasive sentiment was that it would strengthen relationships and result in a better understanding of each group's goals. Other respondents, however, noted that communication is "fine as-is" and emphasized the importance of Program funding instead.

4.1.3 Alignment of Goals

The Program also aims to unify pesticide certification, training, and testing in the Southeast under a common set of goals and objectives. To a certain extent, the Program succeeds in this respect: respondents agreed on the Program's overarching purpose of protecting human health and the environment by encouraging safe and effective pesticide application. However, differences in focus persist, and often echo familiar tensions in federal-state and headquarters-regional relationships. For example, some Extension Specialists and Field Agents view USDA headquarters' emphasis on the Performance Planning and Reporting System (PPRS) as too narrowly focused on "bean counting." They note an important conflict: funding cuts have made it increasingly difficult for Extension Specialists and Field Agents to undertake planned activities, yet USDA is placing more emphasis than ever on the resource-intensive process of measuring outputs and outcomes. In short, a dollar spent on measurement is a dollar not spent on the work that is being measured. EPA headquarters, in turn, praised training efforts but noted that Extension Specialists and Field Agents should place more emphasis on the outcomes of their training (e.g., violations prevented, measurable improvements to human health and the environment).

4.2 Successes and Areas for Improvement: Training Strategies

What are the most successful aspects of pesticide applicator training, testing, and certification programs among EPA Region 4 states? Which aspects need improvement?

States are fairly consistent in the strategies used to train pesticide applicators. The following sub-sections detail EPA Region 4 states' programs in terms of who trains, which methods are employed, and what factors are most important in state decision-making regarding training.

4.2.1 Design and Delivery

Extension Specialists generally take the lead role in drafting, revising, and maintaining training materials, as well as ensuring their consistency throughout each state. When developing and revising materials, Extension Specialists often rely on support from State Lead Agencies and, to a lesser extent, on subject matter experts. Extension Specialists share materials via several means, from the traditional (hard copy) to the innovative (Web sites). Dr. Bob Bellinger (Extension Specialist, South Carolina) developed a comprehensive Web site that serves as a

distribution mechanism for pesticide education information in his state.[11] It features up-to-date resources for applicators (schedules, workbooks, credit listings) as well as a password-protected section for disseminating materials to Extension Agents.

USDA Extension Specialists and Field Agents deliver the bulk of pesticide applicator training in EPA Region 4 states. Field Agents commonly focus on private applicators, delivering training at the county level. Extension specialists focus on commercial applicators, delivering training at regional clinics offered periodically throughout the year. On occasion, industrial entities (e.g., pesticide companies) design and deliver trainings to help boost the supply of applicators trained to use their product. In all cases, State Lead Agencies exercise their right to review and approve content and materials before assigning continuing education credit(s) to a course.

Requirements for trainers vary from state-to-state. Most states do not dictate specific minimum qualifications, but perform a screen on applicants for training positions; some states (e.g., Florida) require a bachelor's degree in a relevant field. Even in states without minimum requirements, bachelor's degrees are common among trainers; master's and doctoral degrees are not uncommon. Some states also require trainers to complete continuing education requirements; for instance, Kentucky's trainers must complete 12 credits annually. In addition, Tennessee and Kentucky require adequate performance on trainer's exams (e.g., Category 10: Demonstration & Research Pest Control; Category 15: Worker Protection Standard) designed by USDA's Pesticide Safety Education Program. Regardless of the presence or absence of minimum requirements, states generally expressed confidence in the abilities and expertise of their trainers.

4.2.2 Methods

IEc found only minor variations among EPA Region 4 states in terms of the methods respondents said they use to train pesticide applicators. Most respondents stressed the importance of "interactive" training that engages students. For example, as part of North Carolina's commercial applicator training, staff dress students in protective equipment rather than simply lecturing them about it. In addition, states commonly intersperse PowerPoint slides and videos with discussions and "Q&A" sessions to review and reinforce important messages. Some states (e.g., Mississippi) are moving toward category-specific training for commercial applicators (e.g., turf and ornamental) and away from traditional, generalized courses.

While acknowledging the benefits of in-person training, several states are expanding efforts to facilitate self-study opportunities for applicators. For example, all Cooperative Extension county offices in South Carolina house a library of videos and training materials for students' use. In North Carolina, select county offices now offer an interactive computer-based training that is fully accredited by the Department of Agriculture for re-certification purposes. Many states also offer workbooks and home study guides for purchase through Extension Specialists or the state department of agriculture.

[11] See <http://entweb.clemson.edu/pesticid/> for more information.

4.2.3 Driving Forces Behind Training Method Choices

In striving to meet the training program's overarching purpose of training applicators in safe pesticide application, partners must work within the existing fiscal environment. Inconsistent (and generally diminishing) Program financing has required more time on the part of Extension Specialists to fill budget shortfalls through alternative means (e.g., obtaining competitive grants from state departments of agriculture or programs like the USDA Hispanic Small Farm Project). State Lead Agencies and Extension Specialists constantly balance the benefits of broadly-applicable training (e.g., the ability to leverage development costs across topics) against associated losses in specificity, particularly for small applicator groups (e.g., aquatic). Performance measurement and reporting activities, which may help secure future funding by demonstrating Program benefits, simultaneously draw budget away from the training activities that funding agencies hope to measure. In short, resource constraints are the most important factor driving Program structure and decision-making.

Language demands are among a set of secondary factors influencing the Program. In accordance with state laws and regulations, several states now make allowances for Spanish speakers to train and take certification exams. For instance, North Carolina's Department of Agriculture employs a bilingual specialist to facilitate translation of exams and training materials into Spanish; Alabama, Florida, and Georgia make similar allowances. In addition to language, state training programs are increasingly influenced by compliance statistics. For example, North Carolina's Extension Specialist meets periodically with the State Department of Agriculture to discuss compliance issues; he modifies training courses to address evolving violation trends as well as new risks and regulations. It is important to note that even these secondary factors are not completely isolated from resource considerations: modifying training requires an investment of time and resources.

4.3 Performance Measurement

How can EPA Region 4 states better measure performance and Program impact?

The majority of stakeholders interviewed believe that the pesticide CTT Program has had a beneficial impact on pesticide applicators. However, most respondents admit that they have few means of measuring or quantifying the Program's impact with respect to exam performance or compliance. This section discusses the qualitative information gathered from interviewees regarding the Program's impact, reviews the data provided in USDA's PPRS reports, examines Georgia's and North Carolina's applicator exam pass rates, and analyzes North Carolina's violation and training data to determine the ease with which outcome-oriented performance measures can be derived from existing data.

4.3.1 Has the Pesticide CTT Program Helped States to Train A Broad Base of Pesticide Applicators?

The range of materials and flexible training schedules offered by Extension Specialists and Field Agents address the diverse needs of the applicator community. Extension Specialists and Field Agents often referred to applicators as their customers or clients and noted making special efforts to ensure their clients were able to work legally. Extension Specialists noted that

the CTT requirements were important not only for ensuring that individuals were aware of the regulations, but also to help improve compliance. One Extension Specialist commented that "applicators do the minimum, and the requirements set the bar for what the minimum is," indicating that the CTT structure was needed to keep applicators in check as well as support them.

In addition to the areas where CTT succeeds in supporting applicators, Extension Specialists noted several areas where they felt the Program fell short and hampered their ability to prepare competent applicators. Financial resources were cited as the primary constraint faced by Field Agents and Extension Specialists as they tried to address the needs of applicators. Extension Specialists target resources towards the large applicator categories, such as lawn, ornamental, or turf; and as a result training opportunities available for specialized applicator categories, such as aquatics, are more limited. One Extension Specialist stated that although he is constantly striving to improve his state's training program, he is also "continually fighting to stay alive" given his limited resources. In addition, Extension Specialists noted that the inconsistency of funding levels affected their ability to plan activities for the coming year.

Related to funding limitations, Field Agents and Extension Specialists felt that they were unable to update training materials as often as necessary. Currently, materials are updated when regulations change. While materials may reflect current regulations, the presentation of the materials is considered outdated. State Lead Agency staff noted that when the Federal regulations change, states are not provided with funds to revise their materials or enforce the new regulations. State level stakeholders suggested that EPA headquarters could provide materials, such as the core training manual, on a more regular basis. A number of State Lead Agency staff, Extension Specialists, and Field Agents joined EPA headquarters in suggesting that improved resource sharing would help states address the shortage of staff and financial resources and enable them to address training needs more effectively. Such an effort would include sharing of training materials as well as the burden of training some of the smaller applicator categories by regionalizing training activities. To the same end, two respondents (one Field Agent and a State Lead Agency staff member) noted that increased consistency in regulations and training requirements across states would facilitate regional collaboration and sharing.

While the states look to the regional and Federal levels for direction in terms of improved coordination between states, EPA headquarters staff indicated that such coordination needed to be directed by the states and through the region. EPA headquarters staff also noted that some state partners were not well coordinated with one another and that tighter integration could help them address their resource constraints. EPA Region 4 Program Officers indicated that they only had funds to visit states twice a year, but believed that additional visits would improve integration and collaboration among states. Both EPA Region 4 and State Lead Agency staff indicated that EPA headquarters was not in tune with the needs of Extension Specialists or Field Agents. One State Lead Agency staff member suggested that EPA headquarters needs to be aware of the "realities on the ground." EPA headquarters, in turn, noted that it shares with USDA its responsibility to maintain a connection with its partners at USDA's Cooperative

Extension Service. EPA's continuing efforts are demonstrated by its collaboration with USDA to "provide unified priorities, direction, guidance, and oversight" to the CTT program.[12]

4.3.2 Has the Training Helped Applicators to Pass State Certification Tests?

The goal of state training efforts is twofold: to help applicators pass the certification exam, and to ensure that applicators comply with regulations that are designed to protect human health and the environment. Respondents relied exclusively on anecdotal evidence when describing training's effects on test performance. Eleven of twenty-one respondents indicated that they believed that training would or does (for those that participate voluntarily) improve exam performance. One respondent also noted that there are additional factors that affect applicators' performance on tests, such as motivation to study and test-taking anxiety. One Extension Specialist highlighted a difference in the relationship between training and test performance for private versus commercial applicators: training did not have a significant impact on exam performance among private applicators, but did affect the performance of commercial applicators. The private applicators' exam is primarily a label reading exam, which verifies that these individuals understand how to translate instructions on the label into safe pesticide application. The commercial exam is based on the pesticide safety manual and thus, the questions are designed to evaluate whether applicators are minimally competent to use restricted use pesticides. To determine whether the sentiments of respondents is born out in data, we examined the test performance of trained and untrained applicators in North Carolina and Georgia. The data presented in Tables 6 and 7 appear to echo the sentiments of respondents that the impact of training depends on a number of factors and is quite varied.

4.3.2.1 North Carolina Training Data

Over the course of 2003 and 2004, the Southern Region Pesticide Safety Education Center at North Carolina State University recorded the exam performance of test takers at several training and examination sessions. From this data, IEc calculated the pass rate of untrained test takers and compared it to the pass rate of the applicators who attended training. Table 6 provides the results of this comparative analysis. For the core exam in particular, trained test takers passed in higher numbers than the untrained test takers. This difference in performance becomes less pronounced when looking at specific exam categories.

Table 6. Pass Rates: Trained vs. Untrained Test Takers in North Carolina

	Core Exam	Pest Exam	Wood Exam
Trained	57%	43%	58%
Untrained	32%	34%	54%

Source: Bob Mckraken, North Carolina State University, 2005.
Notes: Pest and wood refer to specific applicator categories.

[12] EPA's Office of Pesticide Programs. Strategic Program Assessment of the Pesticide Safety Education Program, p. 7. May 2005.

This analysis is subject to several limitations. First, the sample size is small (less than 10) for any one exam category on a given day. Second, an untrained applicator may have studied on his/her own prior to the exam; this simple analysis does not take into account self-study. Third, this analysis only examines the difference in the pass rates between trained and untrained test takers. It does not examine the variation in exam scores between the two groups. Data limitations prevented a more nuanced analysis using exam scores. Finally, the analysis does not take into account any previous pesticide application experience these individuals may have had. Experience as an apprentice or otherwise with pesticide application may explain why the pass rates for trained and untrained applicators is greater with respect to the core exam than with respect to the specialized exams (e.g., pest, wood).

4.3.2.2 Georgia Training Data

Georgia's Department of Agriculture also provided a comparison of the pass rates of trained and untrained commercial applicators taking the test in 2003 and 2004. This data reflects the universe of commercial applicators who took the test in these years. The data was gathered from the five commercial applicator training sessions offered in 2003 and 2004. These sessions included an opportunity to take the exam at the training's conclusion. Pass and fail rates are calculated by session for each year. In addition, the data set provides the number and performance (pass vs. fail) of applicators taking the exam without participating in the training.

Table 7 presents the pass rates from all training sessions for commercial applicators as well as the pass rates for the untrained commercial applicator population. We have combined the data from the training sessions to develop an "overall" pass rate for trained commercial applicators. This sample indicates that roughly twice the number of applicators take the exam without training than prepare for the exam by attending a training session. In 2003, a higher percentage of trained test takers passed the exam relative to untrained test takers. In 2004, however, the reverse proved true: a lower percentage of trained test takers passed the exam than untrained test takers.

Table 7. Pass Rates: Trained vs. Untrained Commercial Applicators in Georgia

	2003		2004	
Training Sessions (at which exam was administered)	Passing Test Takers	Pass Rate	Passing Test Takers	Pass Rate
Turfgrass	53	44%	62	48%
Green Industry	35	56%	27	61%
Gwinnett Technical College	33	83%	19	56%
Additional Special Training, Bibbs County	14	64%	21	47%
Additional Special Training , Houston County	29	66%	N/A	N/A
Total Trained Commercial Applicators	164	57%	129	51%
Total Untrained Commercial Applicators	593	51%	558	54%

Source: Stephen Cole, Agriculture Manager, Coordinator of Special Projects, Georgia Department of Agriculture, Pesticide Division, 2005.

Note: This data represents all commercial applicators certified in 2003 and 2004 (with the exception of those applicators who failed to pay the fee. These exams were not graded, nor were certifications issued). The total number of commercial applicators certified in 2003 was 756 and was 687 in 2004.

Like the North Carolina data, this analysis suffers from several limitations. First, it does not take into account any demographic factors, such as education level or years of experience that may affect test performance. Second, it does not adjust for differences in teaching styles or expertise of the instructors. Finally, this analysis reflects the performance of commercial applicators only. It is not broadly applicable to all applicators.

4.3.2.3 The Prospect of a Pre-Certification Training Requirement

As pre-certification training is not required, but thought to yield beneficial results, Extension specialists, Field Agents, State Lead Agency staff, and EPA Region 4 staff were asked to discuss the prospect of mandatory pre-certification training. Extension Specialists, State Lead Agency staff, Field Agents, and EPA Region 4 staff felt that mandatory training would help applicators prepare for the test and offer them an opportunity to ask questions. One Field Agent pointed out that pre-certification training would prevent individuals from taking the test without preparation. A State Lead Agency staff member posited that reviewing the material on the test would help calm the nerves of test takers who otherwise would perform poorly on the exam. Further, respondents suggested that the training would provide a forum to review issues, including applicator safety, before new applicators developed "bad habits." Respondents agreed that pre-certification training would give applicators a common knowledge base from which to work and ultimately lead to improved compliance and human health.

On the other hand, respondents felt that this additional responsibility would place a significant burden on resources. Extension Specialists and State Lead Agency staff felt that the states were incapable of meeting the demand for such training. Geographic limitations were also cited as a constraint. The Extension system would not be able to provide sufficient training opportunities throughout states. The State Lead Agency staff and Extension Specialists expressed concern that applicators would have to wait several months to attend a training and testing session, preventing them from earning a living. In addition, making training mandatory would require modifications to Federal and/or state regulations.

Some respondents also expressed concern that such training would be a waste of resources because applicators can figure out the regulations on their own and many already know the material. One State Lead Agency staff member was concerned that pre-certification training would discourage applicators from studying the manual, instead relying on the training to review all key exam information.

4.3.3 How Effective is Pesticide Applicator Training in Reducing Violations?

Most respondents indicated that while they believed that training improves compliance, supporting evidence was scarce. Of the 23 stakeholders asked about the link between training and compliance, nine indicated that they believed training did improve compliance and an additional six thought that it was likely to improve compliance. One Extension Specialist noted that, since his state began emphasizing the issue in training, there has been a significant improvement in compliance among applicators with a history of causing drift to occur when applying pesticides. Several Extension Specialists indicated that they used the violation data received from enforcement agents to guide training priorities and felt that this feedback loop enabled training to influence compliance. Four respondents said that although training likely

helped reduce violations, there are individuals who will violate regardless. Lacking data, five respondents stated that they did not know what impact training had on violations.

In the "Plans of Work" submitted by Extension Specialists to USDA's Pesticide Safety Education Program (PSEP), the states provide the results of post-training survey questions, which ask whether trainees "plan to adopt at least one practice" they had learned during a certification training course. This survey is followed up weeks later by another survey that asks whether applicators did indeed "adopt at least one practice" learned in training. Table 8 presents the results of this analysis for Alabama, Florida, Georgia, Mississippi, South Carolina, and Tennessee.

Table 8. Adoption of Pesticide Safety and Risk Management Techniques Learned during Certification or Continuing Education Training

	Alabama	Florida	Georgia	Mississippi	South Carolina	Tennessee
Plan to adopt one practice	50%	97%	87%	27%	75%	100%
Did adopt one practice	26%	71%		16%	47%	90%

Source: PPRS – PSEP Plan of Work, at Http://www.pprs.info/PSEP/ViewPOW.cfm

Notes: Data reflects the percent of applicators participating in pesticide safety education who indicated they would adopt (and did adopt) a pesticide application practice reviewed or learned during the training session. Kentucky and North Carolina do not report this data. Georgia only reports applicators that planned to adopt one practice. All data reflect 2004, except South Carolina for which 2003 was the most recent.

For Florida and Tennessee, this survey indicates that a high percentage of trainees change their practices based on what they learn from training. The results from Mississippi, Alabama, and South Carolina are less encouraging. However, this survey relies on self-reporting and is thus not necessarily an accurate reflection of behavioral changes. Finally, as depicted within the Program's logic model (Figure 2), there are a number of factors other than the efficacy of training that affect the implementation of various safety and risk management practices. One respondent noted that compliance may be a function of employer pressure on employees to save time or money. Several individuals mentioned that violators are frequently unlicensed, and thus untrained. EPA Region 4 noted that compliance is also a function of the number of inspectors in a state and the perceived threat of enforcement.

4.3.4 Is There Potential to Develop Better Outcome Measures?

As the discussion in the previous section indicates, the Program has limited capacity to track behavioral changes associated with training and thus to link training with improvements in compliance, human health, and the environment. Respondents from EPA headquarters, USDA headquarters, and EPA Region 4 were asked about performance measurement. USDA pointed to the PPRS reports as offering both output (e.g., number of applicators trained) and outcome measures (e.g., individuals adopting new practices). Some Extension Specialists said they measure their performance using post-training surveys as well as violation data and pass-fail rates. However, not all Extension Specialists noted receiving pass-fail or violation rates; and none of the Field Agents indicated that they received either piece of information.

Several respondents described specific activities they conduct during training that help them evaluate its impacts. One respondent conducts oral quizzes during the training to get a

sense for what attendees are absorbing. Another respondent said that private applicators were given the certification test before and after training, the results of which helped them to understand the training's impact. However, EPA headquarters and EPA Region 4 both indicated that the available performance measures are largely output oriented and offer little information about the impact of the Program on behavioral or environmental outcomes.

IEc obtained violation and training data from North Carolina in an effort to tie training to behavioral change and offer a model for how such outcome measures can be assembled in the future. Using the applicator license number, we linked training participation to violations committed and determined the number of violators between 2000 and 2004 who received training. In a sample of 328 violators on record between 2000 and 2004, roughly half had received training in 2003, 2004, or 2005, according to North Carolina Department of Agriculture and Consumer Services' online tracking database.

Table 9. North Carolina Pesticide Violators vs. Training Attendance

	Number of Violators	
	Trained (2003 to 2005)	Trained Prior to Violation
Yes	166	21
No	162	307
Total Sample	328	328
Percent of Violating Applicators Trained	51%	6%

Source: EPA Region 4 and North Carolina Department of Agriculture and Consumer Services.

Comparing the date of training to the date of the violation indicates that only 21 of the 166 trained violators had received training prior to committing the infraction (See Table 9). Although 51 percent of violators had been trained, only six percent of violators participated in training prior to receiving their violation. This rough analysis suggests that trained applicators are less inclined to violate regulations, however, the results need to be interpreted with caution. Data limitations prevented an assessment of the relative universe of trained versus untrained applicators. Further, we were unable to make a comparison between the participation in training among violating applicators and applicators who did not violate regulations.

Existing training and violation data organized by a unique identifier (e.g., license number) provide for the potential integration of training, certification, and violation data. However IEc's data review and the stakeholder discussions revealed several barriers. The reliability and completeness of the violation data vary across EPA Region 4 states. Even within relatively complete datasets, the license number is not always accurately captured. Violations are not always attributed to the applicator, but may be assigned to the "responsible party" or applicator's employer. In addition, data tracking mechanisms differ within states as well as among them. Violation, training, and certification information are often tracked in separate systems and in some cases are maintained by different departments or agencies.

5.0 DISCUSSION

This chapter begins with a discussion of the Program's overall progress against the targets laid out within the logic model presented earlier in the report. We conclude by presenting a series of recommendations for Program improvement.

5.1 Assessment Against Logic Model

IEc's discussions and performance measurement analysis demonstrate considerable progress against the logic model presented in Chapter 1. The following sub-sections address the Framework's progress to date within the context of the logic model's specific components.

5.1.1 Inputs and Activities

EPA, USDA, and State Lead Agencies contribute substantial staff effort to the Program. EPA headquarters oversees the national CTT Program and offers guidance to partners on worker protection and other issues. EPA Region 4 manages the CTT Program in the Southeast, serving as the primary point of contact for states and ensuring adherence to reporting and regulatory requirements within the Region. USDA headquarters maintains the Performance Planning and Reporting System, and online portal used by Extension Specialists to submit "plans for work" and annual progress reports. USDA Cooperative Extension designs and maintains training courses as well as performs most applicator training. State Lead Agencies review training materials and administer the testing, certification, and re-certification of pesticide applicators. EPA and states historically have contributed the bulk of Program funding; USDA contributed its first Program funding in 2003.

5.1.2 Outputs

The Program's outputs include training courses and other informational materials aimed at educating applicators in safe pesticide use. These materials help ensure that applicators are positioned to minimize the human health and environmental risk associated with the application of restricted use pesticides. EPA developed a core exam to help states ensure appropriate standards for licensing pesticide applicator, and is developing a core manual to facilitate consistent training content across states. These outputs have impacted their intended audience: pesticide applicators and the general public receiving their services.

5.1.3 Outcomes

Anecdotal data (from discussions) support a hypothesis that the CTT Program's training activities have improved exam performance and applicator practices, each of which is a short-term outcome on the logic model. Quantitative datasets--subject to the limitations noted in Sections 4.3.2 and 4.3.3.--corroborate respondents' views to a certain extent. Data from North Carolina State University indicate improved exam performance among trained applicators. Data from North Carolina Department of Agriculture and EPA Region 4 demonstrate improved compliance among trained applicators.

Improved data collection and data management would support the Program's efforts to track the logic model's intermediate and long-term outcomes. For example, an applicator's social security number or license number could serve as the link between training participation, exam performance, and compliance behavior (see Recommendation 5.2.4 below). The CTT Program may already be attaining these outcomes in the Southeast; improved performance measurement could help demonstrate the Program's successes more explicitly.

5.2 Recommendations for Program Improvement

Based on the information collected during the evaluation, IEc developed a set of recommendations for future Program direction and enhancements designed to improve the Program's cohesiveness, efficiency, and ability to quantify the benefits of its activities.

5.2.1 Address Partners' Funding Concerns

Program partners described substantial variations in annual Program funding as well as a recent downward trend in EPA disbursements. Further, partners felt that the lack of funding-related communication (i.e., with respect to the driving factors for funding decisions) served to increase frustration and compound the challenge of maintaining activity levels with fewer dollars.

EPA is unlikely to be able to fund the CTT Program to the degree desired by Extension Specialists and Field Agents. In addition the CTT Program's sensitivity to dynamic Federal budgetary priorities means that Extension Specialists are increasingly turning to outside funding sources (e.g., competitive grants from state departments of agriculture or programs like the USDA Hispanic Small Farm Project) to bridge budget gaps. Recognizing this fact, EPA and USDA might consider helping Program partners work through these budgetary challenges. For example, EPA Region 4 Program Officers could serve as a clearinghouse for information on EPA and other grants related to pesticide education. This would acknowledge Extension Specialists' efforts in securing additional funds as well as assist them in doing so.

5.2.2. Facilitate Sharing of Training Materials

EPA Region 4 states face similar tasks in educating specific applicator types to safely apply pesticides in accordance with Federal law. While there is currently extensive coordination

within each state to develop and deliver training of a consistently high quality, there is relatively little collaboration among states in this respect. By virtue of their direct relationships with State Lead Agencies and Extension Specialists, EPA Region 4 staff are well positioned to take on an expanded role in leveraging states' efforts to minimize duplication of effort. EPA Region 4 could create a Web site--potentially similar in scope and structure to the one developed and maintained by Dr. Bob Bellinger at Clemson--that would ideally do for EPA Region 4 states what Dr. Bellinger's Web site does for South Carolina's Field Agents: organize activities, disseminate news, and unify materials employed.[13] The Web site could serve the entire EPA Region 4 pesticide community, from State Lead Agency staff to Cooperative Extension staff to the applicators themselves. In addition to centralizing training materials, the Web site could help to unify the Program's stakeholders. For example, by keeping partners informed of each other's work, the Web site might allow for more engagement on related or overlapping tasks.

5.2.3 Improve Program Communications

Program managers should strive to "flatten" the communication structure to facilitate open dialogue among partners. While not mandated to do so, Program partners generally communicate through a traditional "chain of command," with information and directives passing through intermediaries. As a result, partners are frequently unclear as to the goals of (and challenges faced by) other partners. This trend is particularly pronounced as it relates to communications between Cooperative Extension staff and Program managers at USDA headquarters. EPA's continuing efforts are demonstrated by its collaboration with USDA to "provide unified priorities, direction, guidance, and oversight" to the CTT program.[14]

EPA should consider expanding opportunities for interaction among Program partners. For example, a regional CTT coordination meeting could provide for the dialogue required to "air out" stakeholders' goals, challenges, and perspectives. While EPA Region 4's Atlanta offices are an obvious choice for the meeting site, EPA could also schedule the CTT meeting with another pesticide-related event (even if it were not in Atlanta) to facilitate the leveraging of limited travel dollars. While the meeting would certainly entail a time and dollar investment, its benefits (though difficult to quantify) could very well outweigh the costs. For instance, a CTT meeting would serve as an excellent opportunity to address partners' funding concerns (Recommendation 5.2.1) and facilitate materials sharing (Recommendation 5.2.2). With their funding concerns acknowledged and their grant-writing efforts supported, Extension Specialists would be positioned to secure grants that may allow them to improve participation in activities (e.g., tracking and reporting) now emphasized at the headquarters level. In addition, the efficiencies created by expanded materials sharing could ease some of the Program's budgetary pressures. Most importantly, direct interaction among stakeholders will move the Program toward being the true "partnership" envisioned by EPA and USDA three decades ago.

[13] See <http://entweb.clemson.edu/pesticid/> for more information.

[14] EPA's Office of Pesticide Programs. Strategic Program Assessment of the Pesticide Safety Education Program, p. 7. May 2005.

5.2.4 Enhance Data Integration and Performance Measurement Capabilities

The basic data elements of the pesticide CTT Program -- comprising training, testing and violations -- provide a basic platform upon which EPA could potentially develop an outcome-based performance measurement system. With proper structure, such a centralized storehouse could be highly useful if made easily available to Program stakeholders. An applicator's social security number or license number could serve as the link between training participation, exam performance, and compliance behavior. Provided consistent data entry within and among EPA Region 4 states (e.g., by SSN or license number), EPA could identify testing and compliance trends as they vary among trained and untrained applicators.

The resulting outcomes would provide important benefits. To the extent that data show improved compliance among trained applicators, EPA may link its funding for the Program to decreases in pesticide-related risk to human health and the environment (i.e., as displayed in the Program's logic model). Data may also highlight areas for Program improvement. For example, pass/fail data may allow Extension Specialists to target resources (e.g., train-the-trainer funds) on those Field Agents most in need of attention. In addition, EPA could use violation data to formalize a Region-wide feedback loop (similar to the one employed in North Carolina) that provides for training courses to be continually responsive to trends in compliance and enforcement.

5.2.5 Conduct Additional Research on Performance Measures and Training Utility

This evaluation has identified two areas for additional research. First, the pesticide CTT Program should consider conducting additional research to develop a methodology for linking training participation with compliance. Once a comprehensive tracking system has been developed, there will be methodological issues to address prior to developing the outcome measure. For instance, the timing of an applicator's training is critical. Many states require continuing education training for recertification, but few states stipulate when within the certification period an applicator must attend this training. As a result, training may occur in year one or year five of a certification term. If the violation occurs in year three, following training attendance in year one, the analysis must make an assumption as to whether this individual would be considered trained or untrained. For the purposes of the analysis conducted in Section 4.3.4, an applicator who participates in training in any year prior to the violation, whether it be one, two, or three years earlier, is identified as "trained." If one were to conduct a full-scale analysis, this assumption might be too simplistic. A more specific period following training participation could be designated as indicating a person was "trained."

USDA should also consider conducting additional research on the utility of applicator training. A survey of all applicators as to the best methods of reaching them as well as the reasons behind non-compliance would enable all CTT stakeholders to target scarce resources. This investigation could explore whether the reason for non-compliance is lack of information or other motivations, such as efforts to save time. Finally, the survey could analyze responses by applicator type to determine the training preferences of private, commercial, and specialized applicators.

APPENDIX A: STATE APPLICATOR TESTING AND CERTIFICATION REQUIREMENTS

State	Testing Entity	Certifying Entity	Certification Term Length	Credential Term Length	Special Requirements	Re-certification Options
Commercial Applicators						
AL	State Lead Agency	State Lead Agency	3 yrs	3 yrs	Proof of insurance for turf/ornamental/bond/ instruction.	2 - 4 hr meetings; increase with violations (3 units).
FL	Land Grant University	State Lead Agency	4 yrs	4 yrs	3 years work experience, structural only.	2 CEUs per category.
GA	State Lead Agency	State Lead Agency	5 yrs	5 yrs	None.	Between 3 and 8 CEUs in 5 yrs (12 to 25 CEUs for structural applicators). Must complete 90 days before certificate expires.
KY	State Lead Agency	State Lead Agency	3 yrs	3 yrs	None/Proof of insurance (state).	General: 12 CEU hrs. Structural: 9 general CEU hrs, along with 3 specific hours for each category.
MS	State Lead Agency	State Lead Agency	3 yrs	3 yrs	None.	Periodic training, one session per period.
NC	State Lead Agency	State Lead Agency	5 yrs	1 yr, $50 fee	Proof of insurance for certain categories.	Exam or continuing education; few applicators choose to take exam. Number of CEUs varies across categories (eg, ornamental = 10 CEUs/5 yrs). Must spread CEUs over 3 yrs of 5 yr term.
SC	Field Agents	State Lead Agency	5 yrs	1 yr	Proof of insurance.	Exam or continuing education (10 CEUs in 10 yrs); few applicators choose to take exam.
TN	State Lead Agency	State Lead Agency	3 yrs	3 yrs	Obtain charter insurance.	Based on category; between 9 and 30 (18) CEUs.
Private Applicators						
AL	State Lead Agency	State Lead Agency	1 yr	1 yr	Proof of insurance.	Applicators must retake exam.
FL	Field Agents	State Lead Agency	4 yrs	4 yrs	None.	Limited Licenses: 2 CEU core, 2 lawn/structural. Others: 4 CEU core, plus number in category: private 4; aquatic, natural 16; 32 if both.
GA	State Lead Agency	State Lead Agency	5 yrs	5 yrs	None.	Continuing education or examination.
KY	No testing, voluntary test or training	Extension	3 yrs	3 yrs	None.	Retrain or retest every 3 yrs.
MS	USDA Field Agents	State Lead Agency	5 yrs	5 yrs	None.	Mandatory re-examination every 5 yrs.
NC	State Lead Agency	State Lead Agency	3 yrs	1 yr, $50 fee	None.	Continuing education--4 CEUs over 3 years.
SC	Field Agents	State Lead Agency	5 yrs	1yr	None.	Exam or continuing education (5 CEUs in 5 yrs); few applicators choose to take exam.
TN	No test	State Lead Agency	3 yrs	3 yrs	None.	Re-certification with commodity meetings as well as re-training.

Note: Requirements based on respondent interviews. IEc was unable to confirm these data against state laws and regulations.
CEU = Continuing Education Unit.

APPENDIX B: QUALITY ASSURANCE PLAN

Title: Evaluation of EPA Region 4's Pesticide Certification, Training, and Testing Program

Contractor: Industrial Economics, Incorporated (IEc)

Plan Summary: EPA Region 4's Division of Air, Pesticides, and Toxics Management supports pesticide applicator training and certification program activities in the Southeast. In partnership with the United States Department of Agriculture's Cooperative Extension Service and state pesticide regulatory agencies, EPA Region 4 provides oversight of state programs, works with states to update state plans, and facilitates communication throughout the multi-tiered EPA-USDA partnership. EPA headquarters provides financial and other support to USDA and states, which (respectively) train and certify pesticide applicators in a variety of application categories.

Under this work assignment, IEc assisted the region in an evaluation of certain aspects of the pesticide applicator training and certification programs. In designing the evaluation methodology and revising it to suit budgetary and data considerations, IEc collaborated extensively with EPA headquarters and EPA Region 4. Key points of agreement include:

- Data Sources: (1) discussions with Program stakeholders including managers at EPA and USDA headquarters and EPA Region 4; USDA Cooperative Extension staff; and State Lead Agencies; and (2) a case study of North Carolina's training program, including: an analysis of the effects (if any) of training on violations, and a "best practices" study aimed at facilitating more comprehensive and useful data collection regarding training, testing, and violations.

- Analytic Rigor: IEc designed our analyses in the context of the project's overarching evaluation questions and program logic model.

- Consistency: IEc ensured consistent data collection by using a core discussion guide across stakeholder groups; IEc tailored the guide to include only those topics appropriate for each group.

Please refer to the Methodology in Section 3 and the Discussion Guides in Appendix D for more detail.

Audience: We anticipate that the project's final report will be useful to the very stakeholders participating in our discussions: Program managers EPA and USDA headquarters and EPA Region 4; USDA Cooperative Extension staff; and State Lead Agencies.

Organization: Office of Policy, Economics, and Innovation

EPA Project Leaders: John Heffelfinger, OPEI
Michelle Mandolia, OPEI
Troy Pierce, EPA Region 4
Jeaneanne Gettle, EPA Region 4

EPA Quality Manager: Michelle Mandolia, OPEI

Date Drafted: December 2004

APPENDIX C: INTERVIEWEES

Stakeholder Group	Interviewees
EPA/OPP Headquarters Staff	Jeanne Kasai, Certification and Worker Protection Branch Kevin Keaney, Chief, Certification and Worker Protection Branch Richard Pont, Certification and Worker Protection Branch
USDA Headquarters Staff	Monte Johnson, USDA Cooperative Extension Service (CSREES)
EPA Region 4 Staff	Richard Corbet, C&T Program Officer Jeaneanne Gettle Troy Pierce Andy Wilson, C&T Program Officer
USDA Cooperative Extension Specialists	Bob Bellinger, South Carolina C&T Coordinator Wayne Buhler, North Carolina C&T Coordinator Gene Burgess, Tennessee C&T Coordinator Elmo Collum, Mississippi C&T Coordinator Fudd Graham, Alabama C&T Coordinator Paul Guillebeau, Georgia C&T Coordinator Norm Nesheim, Florida C&T Coordinator Lee Townsend, Kentucky C&T Coordinator
USDA Cooperative Extension Field Agents	Frank Henley, Georgia C&T Field Agent Bruce Johnson, South Carolina C&T Field Agent Mary Lamberts, Florida C&T Field Agent Sam Uzzell, North Carolina C&T Field Agent Tommy Yankey, Kentucky C&T Field Agent
State Lead Regulatory Agency Staff	Kathy Booker, Tennessee Department of Agriculture Liz Braxton, Florida Department of Agriculture and Consumer Services James Burnette, North Carolina Department of Agriculture and Consumer Services Carl Falco, North Carolina Department of Agriculture and Consumer Services Ken Franks, Kentucky Department of Agriculture Doug Jones, Georgia Department of Agriculture Derrick Lastinger, Georgia Department of Agriculture Tommy McDaniel, Mississippi Department of Agriculture and Commerce Patrick Morgan, Alabama Department of Agriculture and Industries Joe Parker, Florida Department of Agriculture and Consumer Services Ray Siegel, Kentucky Department of Agriculture

APPENDIX D: DISCUSSION GUIDES

Discussion Questions for USDA Extension Specialists

Program Participation

1. Please describe your role in pesticide applicator training, testing, and certification/re-certification.

2. How would you describe the roles of EPA HQ, EPA Region 4, USDA, and State Regulatory Agencies respectively in program management, oversight, planning, funding, etc.?

3. How have your responsibilities and the responsibilities of field agents varied over time? *From whom do you take direction on such changes?*

State Pesticide Applicator Training Programs

Training Requirements and Methods

4. What are the training and testing requirements in your state? Is the information provided below correct?

TRAINING, TESTING, AND CERTIFICATION REQUIREMENTS IN [STATE]								
Training Required?	Testing Entity	Certifying Entity	Age Requirement (Private)	Age Requirement (Commercial)	Certification Term Length	Credential Term Length	Special Requirements	Re-Certification Options

5. What strategies/methods are used in your state to train pesticide applicators? *Do you use any unique or experimental methods that are transferable to other states?*

6. What training methods have been most effective at reaching students?

7. Why did your state choose to use the specific method(s) you mentioned above for initial and re-certification training (e.g., self study, classroom training, etc.)?

8. What are the pros and cons of requiring pre-certification or pre-test training?

9. Who trains pesticide applicators in your state and what minimum requirements must they meet or experience must they have to attain a training position? *Is re-certification training or continuing education instruction provided by the same individuals?*

10. How effective have pesticide applicator training programs been in meeting the demand from new and returning applicators?

Training Materials

11. Who drafts, revises, and maintains training materials? Are materials consistent throughout your state?

12. How and to what extent are materials distributed or shared? With whom are they shared?

13. When materials are revised or new materials are created, what usually has been the impetus (e.g., new regulation, new pesticide in use, health risks, etc.)?

Communication

14. How frequently do you communicate about the program with EPA HQ, USDA HQ, EPA Region 4, USDA Extension Field Agents, or State Regulatory Agencies?

Frequency of Communication	Partner				
	EPA HQ	USDA HQ	EPA R4	Field Agents	State Regulatory Agencies
Daily					
Several times a week					
Weekly					
Several times a month					
Monthly					
Never					
Other:					

15. What issues do you typically discuss with the partners? (e.g., managerial, financial, or training related, etc.)

16. Please select the phrase or phrases below that best describe(s) your communication with each stakeholder group respectively.

Communication Description	Partner				
	EPA HQ	USDA HQ	EPA R4	Field Agents	State Regulatory Agencies
We communicate well. They understand the program, its goals, and its needs.					
We communicate fairly well, but our priorities differ (e.g., I'm focused on violations and my counterparts are concerned with the number of applicators trained).					
Communication is difficult; they are out of sync with program goals and needs.					
I do not have direct contact with this partner. My comments or thoughts are routed through other partners.					
Other:					

17. What are the barriers to effective communication and information flow between involved parties?
    __ There are no significant barriers to communication.
    __ Lack of time prohibits sufficient communication.
    __ Lack of clearly defined roles and responsibilities for each partner.
    __ Different concept of program objectives at the _____ level (federal, regional, or state).
    __ Insufficient coordination.
    __ Inadequate financial resources.
    __ Other _____

18. Would a greater amount of communication with any party improve your ability to do your job? *If so, with whom? About what? And how would it improve your ability to do your job?*

Fund Disbursement and Use

19. How much funding do you receive for training (initial and re-certification)? From whom (percent from each source)? *Are these funds combined as they make their way to you?*

20. Do you feel that funding levels are sufficient to ensure quality training?

21. How do these funds get from EPA and USDA Headquarters to you?

22. How is the money used by your Land Grant University?

23. What are the limitations, if any, on how you may use the money? Do funding entities or agencies stipulate how or for what activities the funding should be used?

24. How effective is the communication between USDA Headquarters, USDA Cooperative Extension, and Land Grant University budget officials regarding funding status (e.g., initial funding, amount spent, amount billed, amount remaining)?

Program Outputs and Outcomes

25. What are your goals for the training program? (i.e., what end outcomes are you hoping the program will achieve?)

26. How do you assess whether you are meeting your program's goals?

27. What information, if any, do you receive about exam failure rates and violation rates and how is this information used?

28. Do training courses alter would-be applicators' performance on certification examinations?

29. Do training courses alter would-be applicators' eventual compliance tendencies?

30. Do a state's training, testing, and certification/re-certification requirements (or lack thereof) affect compliance tendencies among its certified applicators?

Other

31. Is there anything that your partners could do to better support the program from a technical, financial, or other standpoint?

32. *Is there anything we haven't talked about that you think would be useful for us to know?*

Discussion Questions for USDA Cooperative Extension Field Agents

Program Participation

1. Please describe your role in pesticide applicator training, testing, and certification/re-certification.

2. How would you describe the roles of EPA HQ, EPA Region 4, USDA HQ, and State Regulatory Agencies respectively in program management, oversight, planning, funding, etc.?

3. How have your responsibilities varied over time? *From whom do you take direction on such changes?*

State Pesticide Applicator Training Programs

Training Requirements and Methods

4. What are the training and testing requirements in your state? Is the information provided below correct?

TRAINING, TESTING, AND CERTIFICATION REQUIREMENTS IN ALABAMA								
Training Required?	Testing Entity	Certifying Entity	Age Requirement (Private)	Age Requirement (Commercial)	Certification Term Length	Credential Term Length	Special Requirements	Re-Certification Options

5. What strategies/methods are used in your state to train pesticide applicators? *Do you use any unique or experimental methods that are transferable to other states?*

6. What training methods have been most effective at reaching students?

7. Why did your state choose to use the specific method(s) you mentioned above for initial and re-certification training (e.g., self study, classroom training, etc.)? *From whom, if anyone, do you receive direction on how to conduct your training program?*

8. What are the pros and cons of requiring pre-certification or pre-test training?

9. Who trains pesticide applicators in your state and what minimum requirements must they meet or experience must they have to attain a training position? *Is re-certification training or continuing education instruction provided by the same individuals?*

10. How effective have pesticide applicator training programs been in meeting the demand from new and returning applicators?

11. How have language barriers been successfully managed? What have the failures been, if any?

Training Materials

12. Who drafts, revises, and maintains training materials? Are materials consistent throughout your state?

13. How and to what extent are materials distributed or shared? With whom are they shared?

14. When materials are revised or new materials are created, what usually has been the impetus (e.g., new regulation, new pesticide in use, health risks, etc.)?

Communication and Oversight

15. How frequently do you communicate about the program with EPA HQ, USDA HQ, EPA Region 4, USDA Extension Specialists, and State Regulatory Agencies?

Frequency of Communication	Partner				
	EPA HQ	USDA HQ	EPA Region Four	Extension Specialists	State Regulatory Agencies
Daily					
Several times a week					
Weekly					
Several times a month					
Monthly					
Never					
Other:					

16. What issues do you typically discuss with the partners? (e.g., training logistics, training materials, managerial issues, funding, etc.)

17. Please select the phrase or phrases below that best describe(s) your communication with each stakeholder group respectively.

Communication Description	Partner				
	EPA HQ	USDA HQ	EPA R4	Extension Specialists	State Regulatory Agencies
We communicate well. They understand the program, its goals, and its needs.					
We communicate fairly well, but our priorities differ (e.g., I'm focused on violations and my counterparts are concerned with the number of applicators trained).					
Communication is difficult; they are out of sync with program goals and needs.					
I do not have direct contact with this partner. My comments or thoughts are routed through other partners.					
Other:					

18. What are the barriers to effective communication and information flow between involved parties?
    __ There are no significant barriers to communication.
    __ Lack of time prohibits sufficient communication.

__ Lack of clearly defined roles and responsibilities for each partner.
__ Different concept of program objectives at the _____ level (federal, regional, or state).
__ Insufficient coordination.
__ Inadequate financial resources.
__ Other _____

19. Would a greater amount of communication with any party improve your ability to do your job? *If so, with whom? About what? And how would it improve your ability to do your job?*

Program Outputs and Outcomes

20. What are your goals for the training program? (i.e., what end outcomes are you hoping the program will achieve?)

21. How do you assess whether you are meeting your program's goals?

22. What information, if any, do you receive about exam failure rates and violation rates and how is this information used?

23. Do training courses alter would-be applicators' performance on certification examinations?

24. Do training courses alter would-be applicators' eventual compliance tendencies?

25. Do a state's training, testing, and certification/re-certification requirements (or lack thereof) affect compliance tendencies among its certified applicators?

Other

26. Is there anything that the HQ, Regional or state partners could do to better support your work from a technical, financial, or other standpoint?

27. *Is there anything we haven't talked about that you think would be useful for us to know?*

Discussion Questions for Staff at State Lead Regulatory Agencies

Program Participation

1. Please describe your role in pesticide applicator training, testing, and certification/re-certification.

2. How would you describe EPA's contributions to this program? EPA Region 4's contribution? USDA's contributions?

Communication

3. How frequently do you communicate about the program with EPA HQ, EPA Region 4, USDA HQ, and USDA Extension Specialists and Field Agents?

Frequency of Communication	Partner				
	EPA HQ	EPA R4	USDA HQ	Extension Specialists	Field Agents
Daily					
Several times a week					
Weekly					
Several times a month					
Monthly					
Never					
Other:					

4. What types of issues do you discuss with the partners? (e.g., managerial issues, funding, etc.)

5. Please select the phrase or phrases below that best describe(s) your communication with each stakeholder group respectively.

Communication Description	Partner				
	EPA HQ	EPA R4	USDA HQ	Extension Specialists	Field Agents
We communicate well. They understand the program, its goals, and its needs.					
We communicate fairly well, but our priorities differ (e.g., I'm focused on violations and my counterparts are concerned with the number of applicators trained).					
Communication is difficult; they are out of sync with program goals and needs.					
I do not have direct contact with this partner. My comments or thoughts are routed through other partners.					
Other:					

6. What are the barriers to effective communication and information flow between involved parties?

__ There are no significant barriers to communication.
__ Lack of time prohibits sufficient communication.
__ Lack of clearly defined roles and responsibilities for each partner.
__ Different concept of program objectives at the _____ level (federal, regional, or state).
__ Insufficient coordination.
__ Inadequate financial resources.
__ Other _____

7. Would a greater amount of communication with any party improve your ability to do your job? *If so, with whom? About what?*

Fund Disbursement and Use

8. How much funding does EPA provide for pesticide certification (initial and re-certification)? In addition to EPA, which entities (if any) fund certification programs (initial and re-certification)? Are these funds combined as they make their way to the State Regulatory Agencies?

9. Who manages the flow of EPA pesticide applicator certification dollars from EPA HQ to State Regulatory Agencies?

10. Does EPA stipulate the roles, responsibilities, or activities conducted by State Regulatory Agencies? *What are the limitations, if any, on how State Regulatory Agencies may use the money? Hove these roles and responsibilities varied overtime?*

State Pesticide Applicator Training Programs

11. What are the specific driving forces for conducting the training programs as they are conducted in your state?

12. What are the training and testing requirements in your state? Who trains pesticide applicators in your state and what minimum requirements must they meet or what background training and experience must they or do they typically have to attain a training position? Who provides re-certification training or continuing education instruction?

TRAINING, TESTING, AND CERTIFICATION REQUIREMENTS IN [STATE]								
Training Required?	Testing Entity	Certifying Entity	Age Requirement (Private)	Age Requirement (Commercial)	Certification Term Length	Credential Term Length	Special Requirements	Re-Certification Options

13. What are the pros and cons of requiring training before taking the certification exam?

14. How have language barriers been successfully managed? What have the failures been, if any?

15. Training methods: What strategies/methods are used in your state to train pesticide applicators? What training methods have been most effective at reaching students? Are there gaps in training (i.e., as indicated by elevated violation rates in certain areas)?

16. How effective have pesticide applicator testing and certification programs been in meeting the demand for numbers of new or returning applicators?

Strategic Objectives

17. What are your goals for the certification program? (i.e., what end outcomes are you hoping the program will achieve?)

18. How do the perspectives on program goals differ among EPA HQ, EPA Region 4, USDA, and your state regulatory agency?

Program Outputs and Outcomes

19. How do you assess whether you are meeting your program's goals?

20. Do training courses alter would-be applicators' performance on certification examinations?

21. Do training courses alter would-be applicators' eventual compliance tendencies?

22. Do a state's training, testing, and certification requirements (or lack thereof) affect compliance tendencies among its certified applicators?

Other

23. Is there anything that the HQ, Regional or state partners could do to better support your work from a technical, financial, or other standpoint?

24. *Is there anything we haven't talked about that you think would be useful for us to know?*

Discussion questions for EPA Region 4 Staff

Program Participation

1. Please describe your role in the oversight and planning of the training, testing, and certification/re-certification program.

2. Do you contribute to the development of training materials and/or testing materials? If so, what is your role in drafting these materials?

Communication

3. How frequently do you communicate about the program with EPA HQ, USDA HQ, USDA Extension Specialists and Field Agents, and State Regulatory Agencies?

Frequency of Communication	Partner				
	EPA HQ	USDA HQ	Extension Specialists	Field Agents	State Regulatory Agencies
Daily					
Several times a week					
Weekly					
Several times a month					
Monthly					
Never					
Other:					

4. What is the nature of your communication? (e.g., managerial issues, funding, etc.)

5. Please select the phrase or phrases below that best describe(s) your communication with each stakeholder group respectively.

Communication Description	Partner				
	EPA HQ	USDA HQ	Extension Specialists	Field Agents	State Regulatory Agencies
We communicate well. They understand the program, its goals, and its needs.					
We communicate fairly well, but our priorities differ (e.g., I'm focused on violations and my counterparts are concerned with the number of applicators trained).					
Communication is difficult; they are out of sync with program goals and needs.					
I do not have direct contact with this partner. My comments or thoughts are routed through other partners.					
Other:					

6. What are the barriers to effective communication and information flow between involved parties?

   __ There are no significant barriers to communication.
   __ Lack of time prohibits sufficient communication.
   __ Lack of clearly defined roles and responsibilities for each partner.
   __ Different concept of program objectives at the _____ level (federal, regional, or state).
   __ Insufficient coordination.
   __ Inadequate financial resources.
   __ Other _____

7. Would a greater amount of communication with any party improve your ability to do your job? *If so, with whom? About what? And how would it help?*

Fund Disbursement and Use

8. In addition to EPA and USDA Headquarters, which entities (if any) fund training programs (initial and re-certification)? Are these funds combined before being disbursed to Extension Specialists?

9. Who manages the flow of EPA and USDA pesticide applicator training dollars from Headquarters to Extension Specialists?

10. How is the money used by Land Grant Universities? What are the limitations, if any, on how Land Grant Universities may use the money? *How does this vary from state to state?*

11. Do funding entities or agencies involved in fund disbursement stipulate roles and responsibilities for the Extension Specialists or Field Agents? To what degree have these roles and responsibilities changed over time?

12. How effective is the communication between USDA Headquarters, USDA Cooperative Extension, and Land Grant University budget officials regarding funding status and the requirements attached to the money (e.g., initial funding, amount spent, amount billed, amount remaining)?

State Pesticide Applicator Training Programs

13. What are the driving forces behind state decisions to conduct training programs? What are the pros and cons of requiring applicators to take a training course before taking the exam?

14. What is the rationale for choosing specific training methods (e.g., self-study, classroom training, etc.)?

15. Are there certain qualities that consistently characterize effective (and ineffective) training materials or techniques?

Strategic Objectives

16. How do the perspectives on program goals differ among EPA HQ, EPA Region 4, USDA, and state regulatory agencies?

17. Do the Extension Specialists and Field Agents have a different perspective on the program's goals than EPA or USDA HQ?

Program Outputs and Outcomes

18. Do training courses alter would-be applicators' performance on certification examinations? Eventual compliance tendencies?

19. Do a state's training, testing, and certification/re-certification requirements (or lack thereof) affect compliance tendencies among its certified applicators?

20. Currently, how are program outputs and outcomes measured and tracked? Do you feel that the current system is effective?

21. Are there ways to facilitate more measurable outcomes (e.g., longitudinal tracking of trainees through testing and, where applicable, future violations)?

Other

22. Is there anything that the Region's partners could do to better support the program from a technical, financial, or other standpoint?

Discussion Questions for EPA Headquarters Staff

Program Participation

1. How would you characterize the nature of EPA HQ's involvement in and contributions to state training, testing, and certification/re-certification programs?

2. What role does your group play in program oversight and planning? In developing training materials and/or testing materials for the states?

3. How would you describe the roles of USDA, EPA Region 4, Land Grant Universities, and State Regulatory agencies respectively in program management, oversight, planning, funding, etc.?

Communication

4. How frequently do you communicate with program partners? (e.g., daily, weekly, monthly.) With which partners do you have the most contact? (EPA Region 4,USDA, Land Grant Universities (Extension Specialists or Field Agents), State Regulatory Agencies)

5. What types of issues do you discuss with the partners? (e.g., managerial issues, funding, etc.)

6. What are the barriers to effective communication and information flow between involved parties?
   __ There are no significant barriers to communication.
   __ Lack of time prohibits sufficient communication.
   __ Lack of clearly defined roles and responsibilities for each partner.
   __ Different concept of program objectives at the _____ level (federal, regional, or state).
   __ Insufficient coordination.
   __ Inadequate financial resources.
   __ Other _____

7. Would a greater amount of communication with any party improve program efficiency and effectiveness? *If so, with whom? About what? And how would it improve efficiency and/or effectiveness?*

Fund Disbursement and Use

8. How much funding does EPA provide for pesticide training (initial and re-certification)?

9. What other entities (if any) fund these training programs (initial and re-certification)? *Are these funds combined as they make their way to the Extension Specialists?*

10. Who manages the flow of EPA and USDA pesticide applicator training dollars from Headquarters to Extension Specialists?

11. Does EPA make stipulations regarding the use of the funding (e.g., reporting, program monitoring)? *What does EPA require of funding recipients? How are recipients notified of these requirements (e.g., documents directly to recipients, USDA communicates)?*

12. Do other funding entities or agencies stipulate the roles and responsibilities of the Extension Specialists? To what degree have these roles and responsibilities changed over time?

13. Do you feel that funding levels are sufficient to ensure quality training?

Strategic Objectives

14. What is the value of this partnership to EPA?

15. To what extent do the various parties' goals for the pesticide applicator training, testing, and certification/re-certification programs align with one another? To what extent do they differ?

16. Do differences in the perception of program goals among the various parties impact the effectiveness of the program?

Program Outputs and Outcomes

17. How could EPA more effectively support these programs to decrease violations and reduce risks to human health?

18. Currently, how are program outputs and outcomes measured and tracked? Do you feel that the current system is effective?

19. Are there ways to facilitate more measurable outcomes (e.g., longitudinal tracking of trainees through testing and, where applicable, future violations) of this program's success?

Other

20. Is there anything that EPA's partners could do to better support the program from a technical, financial, or other standpoint?

21. *Is there anything we haven't talked about that you think would be useful for us to know?*

Discussion Questions for USDA Headquarters Staff

Program Participation

1. What is USDA's role in the state pesticide applicator training, testing and certification/ re-certification programs?

2. What role does USDA play in program oversight and planning for the training, testing, and certification/re-certification of pesticide applicators? In developing training materials and/or testing materials for the states?

3. Who provides Extension Specialists with direction regarding the training program? From whom do Extension Specialists take direction regarding their activities?

4. How would you describe the roles of EPA HQ, EPA Region 4, Land Grant Universities, and State Regulatory agencies respectively in program management, oversight, planning, funding, etc.?

Communication

5. How frequently do you communicate with program partners? (e.g., daily, weekly, monthly.)

6. What types of issues do you discuss with the partners? (e.g., managerial issues, funding, etc.)

7. What are the barriers to effective communication and information flow between involved parties?
   __ There are no significant barriers to communication.
   __ Lack of time prohibits sufficient communication.
   __ Lack of clearly defined roles and responsibilities for each partner.
   __ Different concept of program objectives at the _____ level (federal, regional, or state).
   __ Insufficient coordination.
   __ Inadequate financial resources.
   __ Other _____

8. Would a greater amount of communication with any party improve program efficiency and effectiveness?

Fund Disbursement and Use

9. How much funding does USDA provide for pesticide training (initial and re-certification)?

10. How effective is the communication between USDA Headquarters, USDA Cooperative Extension, and Land Grant University budget officials regarding funding status (e.g., initial funding, amount spent, amount billed, amount remaining)?

11. Who manages the flow of EPA and USDA pesticide applicator training dollars from Headquarters to Extension Specialists?

12. Does USDA or other funding entities or agencies stipulate the roles, responsibilities, or activities conducted by Land Grant Universities (e.g., reporting requirements, record keeping)?

13. How have the responsibilities of Extension Specialists and field agents varied over time?

Strategic Objectives

14. What is the value of this partnership to USDA?

15. To what extent do the various parties' goals for the pesticide applicator training, testing, and certification/re-certification programs align with one another? To what extent do they differ?

16. Do differences in goals among the various parties affect the impact of the program?

Program Outputs and Outcomes

17. Currently, how are program outputs and outcomes measured and tracked? Do you feel that the current system is effective?

18. Are there ways to facilitate more measurable outcomes (e.g., longitudinal tracking of trainees through testing and, where applicable, future violations) of this program's success?

Other

19. Is there anything that USDA's partners could do to better support the program from a technical, financial, or other standpoint?

APPENDIX E: SUMMARY OF FINDINGS

Indicator/Measure	Stakeholders Discussing Topic						Finding/Result
	EPA HQ	USDA HQ	R4	State	Ext. Spec.	Ext. Agent	
Overarching Question 1: How successful has the partnership been in supporting state training efforts?							
Roles and Responsibilities							
What is the nature of each partner's involvement in and contributions to state training, testing, and certification/re-certification programs?	x	x	x	x	x	x	EPA Headquarters: Serve as primary funding entity; funnel money through USDA (see below). Conduct program oversight. Developing a core training manual and certification exam; working with states to implement more broadly. USDA Headquarters: Receive EPA funds; determine funding for each state; disburse funds to land grant universities. Statutory restrictions prevent land grant universities from charging overhead to USDA; hence USDA plays an important role as a no-overhead funnel for EPA dollars. USDA also maintains the Performance Planning and Reporting System (PPRS), an online portal for tracking program activities. Little role in day-to-day program operations (e.g., developing training and testing materials). EPA Region 4: Serve as contact point for states. Provide guidance on funding; interact with State Lead Agency on training/testing content; answer questions related to Federal requirements. USDA Cooperative Extension Specialists: Design training materials (for private/commercial) and coordinate their dissemination to Field Agents throughout state. To a lesser degree: design and administer certification exams; conduct training for certain commercial applicator categories; help determine credits awarded for course completion. USDA Cooperative Extension Field Agents: Conduct training for all private applicators and certain categories of commercial applicators. To a lesser degree: coordinate training-related outreach efforts (e.g., newspaper notices); administer certification exams. State Lead Agencies: Approve training materials; determine credits awarded. Develop and administer exams; license applicators. Maintain continuing education records for re-certification. Execute and Enforce laws/regulations and record/track violations.

APPENDIX E: SUMMARY OF FINDINGS

Indicator/Measure	Stakeholders Discussing Topic						Finding/Result
	EPA HQ	USDA HQ	R4	State	Ext. Spec.	Ext. Agent	
From whom do Extension Specialists and Field Agents take direction regarding their activities? Have responsibilities varied over time?	x	x			x	x	Extension Specialists take direction from USDA HQ and, in an informal capacity, from EPA. State Lead Agencies generally have approval rights for training materials. Extension Field Agents take direction from their state's Extension Specialist. Extension Specialists and Field Agents generally described few substantial changes in their responsibilities over time. In cases where responsibilities have changed, such changes were modest (e.g., one Extension Specialist spends more time applying for grants to make up for recent decreases in EPA funding; one Field Agent noted increases in the amount of material covered).
Strategic Objectives							
What is the value of this partnership to EPA and USDA?	x	x					EPA and USDA described the symbiotic value of the partnership: each side benefits from the contributions of the other. USDA benefits from substantial EPA funding (USDA also contributed $425k in 2003). Additionally, USDA's statutory "no overhead" arrangement with land grand universities allows each EPA dollar to directly fund training, testing, and certification activities. EPA also leverages the relationships and infrastructure of USDA's Cooperative Extension Service to design and deliver training at the local scale.
To what extent do the various parties' goals for the pesticide applicator training, testing, and certification/re-certification programs align with one another?	x	x	x	x	x	x	Respondents across all categories emphasized the overarching goal of minimizing pesticide-related risk to human health and the environment. Field Agents and Extension Specialists, in particular, stressed the importance of helping applicators (a) understand what is required of them under applicable laws and regulations; and (b) appreciate the notion of "timely and judicious" pesticide use as a final option after other management methods have been exhausted. One Extension Specialist's goal is to improve his state's training program while "continually fighting to stay alive" with tightening funds. The responses of two State Lead Agency staff emphasized their Agencies' focus on state needs. One State Lead Agency staff member stressed "customer satisfaction" among applicators and the state's people; his Agency strives to ensure a base of well-trained applicators sufficient to meet demand for pesticide services in the state. Another State Lead Agency staff member noted the importance of pesticides to his state's agricultural economy: one of his goals is to ensure highly-trained users so that certain pesticides--which he views as inherently risky--are not banned outright.

APPENDIX E: SUMMARY OF FINDINGS

Indicator/Measure	Stakeholders Discussing Topic						Finding/Result
	EPA HQ	USDA HQ	R4	State	Ext. Spec.	Ext. Agent	
Do differences in the perception of program goals among the various parties impact the effectiveness of the program?	x	x	x	x	x	x	Respondents agreed on the program's overarching goal: to train applicators in safe pesticide application. Respondents' disagreements echo familiar tensions in federal-state and HQ-regional relationships. For example, some Extension Specialists and Field Agents view USDA HQ's emphasis on PPRS reporting as too narrowly focused on "bean counting." They note the two competing demands made more difficult by funding cuts: undertaking planned educational activities (i.e., produce the "beans"), and the resource-intensive process of measuring outputs and outcomes emphasized by USDA (i.e., counting the "beans"). In short, a dollar spent on measurement is a dollar not spent on what's being measured (i.e., training effectiveness). EPA HQ, in turn, praised training efforts but noted that Extension Specialists and Field Agents placed too little emphasis on the outcomes of their training (e.g., violations prevented, measurable improvements to human health and the environment). Stakeholders generally viewed the accord on the program's overall goals as being more important than these limited points of disagreement.
Communication							
How frequently do program partners communicate with each other?	x	x	x	x	x	x	See Table 5 for Summary Responses. Stakeholders communicate with Extension Specialists, Field Agents, and State Lead Agencies most frequently. The majority of stakeholders noted that they rarely or never communicate with EPA HQ, USDA HQ, and EPA Region 4. The frequency of communication with other stakeholders demonstrates more variability, ranging from daily to several times a month.
Which issues do program partners discuss?	x	x	x	x	x	x	See Section 4.1.2.2 for a discussion of responses.
How do partners rate the quality of their communications with each other?			x	x	x	x	See Table 4 for Summary Responses. Most stakeholders indicated that they communicate well with their partners and view the goals of the program in the same light. More respondents felt they communicated well with Extension Specialists, Field Agents, and State Lead Agency staff then other partners. Although communication is good with other stakeholders, some respondents felt that others' goals and priorities differed from their own. Other respondents noted not having direct contact with certain stakeholders, instead routing information through the "chain of command." This trend was particularly true of communication with EPA HQ, USDA HQ, and

APPENDIX E: SUMMARY OF FINDINGS

Indicator/Measure	Stakeholders Discussing Topic						Finding/Result
	EPA HQ	USDA HQ	R4	State	Ext. Spec.	Ext. Agent	
							EPA Region 4. Several respondents declined to answer this question as they felt they did not have enough interaction with a particular party to evaluate the quality of communication.
What are the barriers to effective communication?	x	x	x	x	x	x	Nine respondents (of 30, spread among categories) cited time constraints as the most important barrier to communication. Eight respondents of 30 cited "no significant barriers." Respondents citing "other" barriers described issues such as personality conflicts; interagency politics (e.g., USDA complains of decreased EPA funding but has only recently put any money into the program); lack of travel (i.e., the need to do more business in person); and different concepts of program goals (e.g., HQ focus on "beans" vs. Coop. Ext. focus on "nuts and bolts").
Would increased communication improve the program?	x	x	x	x	x	x	Among the 18 respondents (of 30 responding to the question) who felt that increased communication would help improve the program, the pervasive sentiment was that it would strengthen relationships and result in a better understanding of each group's goals for the program. The 10 respondents (of 30 responding to the question) who posited that increased communication would not help the program often noted that communication is "fine as-is" and that program funding is a more important issue.
Fund Disbursement and Use							
How much funding do R4 states receive for pesticide training, testing, and certification? From whom?	x	x	x	x	x		Extension Specialists generally receive between $20-30k annually from EPA for training activities. In addition to using EPA funds, Extension Specialists are resourceful in obtaining funds from alternate sources (e.g., fees from workbooks and course registrations; fees from counties using materials). Relative to Extension Specialists, State Lead Agencies receive more of EPA's certification-related funding; for example, one state's structural pesticide program estimates annual funding at about one FTE (roughly $80k), while another state's agricultural program estimates $150k annually. In several cases, the state matches some or all of each Federal dollar disbursed for certification. EPA Region 4 also funds special projects.

APPENDIX E: SUMMARY OF FINDINGS

Indicator/Measure	Stakeholders Discussing Topic						Finding/Result
	EPA HQ	USDA HQ	R4	State	Ext. Spec.	Ext. Agent	
Who manages the flow of money from source to recipient? Are funds combined? Do funding entities place stipulations on funded activities?	x	x	x	x	x		EPA HQ routes its dollars through USDA HQ, which uses a funding formula to determine the disbursement amounts for each state's Land Grant University (the proxy for each state's USDA Extension Specialist). Specialists, in turn, determine allocation amounts among their Field Agents. State Lead Agencies receive EPA HQ funding through EPA Region 4. Because of broadly written grant requirements, recipients retain substantial discretion to combine grant dollars into a single "pot" and employ funds for the most pressing needs. (Funds for special projects are an exception; recipients manage them separately.)
How effective is communication regarding funding status and stipulations?	x	x	x		x		Several Extension Specialists noted that funding communications could be clearer. One Specialist suggested that official budget notifications should go to Specialists in addition to university budget offices so that specialists are aware of and able to use all funding available. Two Specialists complained of poor communications surrounding the driving factors for EPA's recent funding cuts. EPA Region 4 staff acknowledged past difficulties in this area, but noted recent improvements.
How are funding dollars used by Land Grant Universities and State Lead Agencies?				x	x		Land Grant Universities: training and salaries for support staff. State Lead Agencies: in accordance with approved state plans.
Do partners feel that funding levels are sufficient to ensure quality training?	x				x		Program partners (EPA included) acknowledged the difficulties precipitated by recent EPA funding cuts. While funding was once sufficient, steady erosion means that EPA funds alone are insufficient to prepare and deliver quality training. EPA noted that the program's funding is discretionary and subject to year-to-year variations in the broader Federal budget. Training funds suffer particularly because regulations do not require training (only certification).
Overarching Question 2: What are the most successful aspects of pesticide applicator training, testing, and certification programs among EPA Region 4 states? Which aspects need improvement?							
State Requirements							
How do training, testing, and certification requirements vary across R4 states?			x	x	x	x	See Appendix A for Summary Responses
Training Methods							
What strategies/methods are used to train pesticide applicators?				x	x	x	Method used include study guides/self-study, videos, question and answer sessions, correspondence courses, PowerPoint presentations, interactive TV/CD/computer, Online course, classroom presentations and exercises (label

APPENDIX E: SUMMARY OF FINDINGS

Indicator/Measure	Stakeholders Discussing Topic						Finding/Result
	EPA HQ	USDA HQ	R4	State	Ext. Spec.	Ext. Agent	
							reading).
Who trains pesticide applicators in R4 states? What minimum requirements must they meet, or what background training and experience must they or do they typically have to attain a training position?				x	x	x	Trainers: Field Agents and Extension Specialists provide initial training when required. In some states, Field Agents focus on private applicators, while Extension Specialists train commercial applicators. Background of Trainers: Requirements for trainers differ from state to state. Some states do not require any specific qualifications, but perform an informal screen of applicant resumes before approving them for training positions. In other states, trainers are required to have a BA (minimum) in a relevant field. Many have an MA or PhD. One state noted that in addition to a degree in agriculture, trainers must complete 12 continuing education credits each year. A number of states noted that trainers must pass specific exams such as Category 10 or Category 15 exams.
Who provides re-certification training or continuing education instruction?				x	x	x	In many states, continuing education course materials are submitted by industry, associations, and Cooperative Extension to the State Lead Agency staff for review and approval. States review the credentials of the trainer and course content before approval.
What are the driving forces for conducting training as they are conducted in each state?			x	x	x	x	Extension Specialists and Field Agents cited financial and time constraints as the driving forces behind the training mechanism. Financially the states are spread thin so they must ensure methods and content are broadly applicable. They must also make training convenient enough for applicators. Private applicators, for example, will not travel so instructors have to bring the training to them. Flexibility is critical because there are new applicants all the time. They need to be able to offer them training to enable them to get the certification they need to earn a living. EPA Region 4 indicated that pesticide safety is the primary driving force. In addition, resources, personnel, and preference of states dictate training. State Lead Agency staff cited the need to make sure that applicators use pesticides safely and that they know the regulations. Needs of applicators and safety dictate content. In one state, a high violation rate resulted in an increase in training.
Which training methods are most effective at reaching students?			x	x	x	x	Interactive training and exercises; category specific training; demonstrations; small groups improve participation.

APPENDIX E: SUMMARY OF FINDINGS

Indicator/Measure	Stakeholders Discussing Topic						Finding/Result
	EPA HQ	USDA HQ	R4	State	Ext. Spec.	Ext. Agent	
Are there gaps in training (i.e., as indicated by elevated violation rates in certain areas)?				x			Use enforcement data to identify gaps in knowledge and work with extension to target these areas in training sessions. Some gaps in training availability for niche applicator types. There is not enough demand and too few resources to offer consistent training sessions.
How have language barriers been successfully managed? What have the failures been, if any?				x	x	x	Respondents either noted that there were no language barriers or that in spite of language barriers, the pesticide labels were in English and therefore training and testing were in English. In some states, the law stipulates that tests only be offered in English since the labels are in English. North Carolina offers training in Spanish for both private and commercial categories. The exam is also offered in Spanish. Alabama makes some allowances for Spanish speakers, enabling them to take the test with a translator. Georgia and Florida also have some approved training courses in Spanish.
How effective have pesticide applicator testing and certification programs been in meeting the demand for numbers of new or returning applicators?				x	x	x	For the most part, states are able to meet the demand, but some felt resources were spread too thin. Several respondents noted that it was difficult to address the needs of small applicator groups. One respondent stated that there was plenty of training, it was just difficult to get applicators to show up.
Training Materials							
Who drafts, revises, and maintains training materials? Are materials consistent throughout R4 states?					x	x	Extension Specialists generally take the lead role in drafting, revising, and maintaining training materials, as well as ensuring their consistency throughout each state. When developing and revising materials, Extension Specialists often rely on support from State Lead Agencies and, to a lesser extent, on subject matter experts.
How and to what extent are materials distributed or shared? With whom are they shared?					x	x	Extension Specialists share materials via several means, from the traditional (hard copy) to the innovative (Web sites). Dr. Bob Bellinger's comprehensive Web site (for South Carolina) might serve as a model. It features up-to-date resources for applicators (schedules, workbooks, credit listings) as well as a password-protected section for disseminating materials to Extension Agents. Extension Specialists also share materials between states to a limited extent (e.g., Georgia, South Carolina, North Carolina).
When materials are revised or new materials are created, what usually has been the impetus?					x	x	Extension Specialists modify training to reflect changes to regulations; new risks (e.g., 1997 methylparathion scare; herbicide resistance; soybean rust). In North Carolina, the State Department of Agriculture meets with Extension Specialist twice annually to help target training on current enforcement trends.

APPENDIX E: SUMMARY OF FINDINGS

Indicator/Measure	Stakeholders Discussing Topic						Finding/Result
	EPA HQ	USDA HQ	R4	State	Ext. Spec.	Ext. Agent	
Overarching Question 3: How can EPA Region 4 states better measure performance and Program impact? ***Sub-Questions: Has the program helped states to train a broad base of pesticide applicators?, Has the training helped applicators to pass state certification tests?***							
Do training courses alter would-be applicators' performance on certification examinations?			x	x	x	x	North Carolina was able to provide data on the pass fail rates of trained versus untrained test takers. North Carolina Trained vs. Untrained Test Taker Pass Rates: Core Pest Wood Trained 57% 43% 58% Untrained 32% 34% 54% Almost all respondents stated that they believed training did alter performance on the exam. However, they offered two caveats. First, respondents, for the most part, did not have data to support this conclusion. Their response was based on anecdotal evidence. Second, most states do not require that applicators take a training course prior to the exam. As a result, the relationship between training and test performance was difficult to prove. Those respondents that did not indicate that training improved exam performance simply stated that they have no way to gauge whether there was a direct impact on performance, most notably because there is insufficient data. However, one respondent also noted that there are other factors affecting applicators' performance on tests, such as motivation to study and test-taking anxiety. One Extension Specialist noted a difference between private and commercial applicators. He noted that training did not have a significant impact on exam performance among private applicators, but that it did affect the performance of commercial applicators. The private applicators' exam is primarily a label reading exercise, where as the commercial exam questions reflect the material covered by the manual (which also serves as the core curriculum for the training).

APPENDIX E: SUMMARY OF FINDINGS

Indicator/Measure	Stakeholders Discussing Topic						Finding/Result
	EPA HQ	USDA HQ	R4	State	Ext. Spec.	Ext. Agent	
Overarching Question 3: How can EPA Region 4 states better measure performance and Program impact? ***Sub-Questions: How effective is the pesticide CTT program in reducing violations? Is there potential to develop better outcome measures?***							
Program Outputs and Outcomes							
Do training courses alter would-be applicators' eventual compliance tendencies?			x	x	x	x	Most respondents indicated that they believed that training improves compliance, but that they had no data to verify this belief. A number of stakeholders also noted that there are certain applicators that will violate regardless of training or regulations. One respondent noted that compliance may be a function of employer pressure on employees to save time or money. In annual plan of work Pesticide Safety Education Program reports, the states detail the results of post- pesticide safety and education training survey questions that ask whether trainees "plan to adopt at least one practice." This survey is followed up weeks later, to determine whether applicators did indeed "adopt at least one practice" learned in pesticide safety and education training. Percent of Persons Trained Who: AL FL MS SC TN Plan to adopt one practice: 50% 97% 27% 75% 100% Did adopt one practice: 26% 71% 16% 47% 90%
Do a state's training, testing, and certification/re-certification requirements (or lack thereof) affect compliance tendencies among its certified applicators?			x	x	x	x	Extension Specialists indicated that the CTT requirements do affect compliance, noting that the structure was important. One respondent commented that "applicators do the minimum, and the requirements set the bar for what the minimum is." Another respondent noted that in his/her state more violations are committed by people using unregulated pesticides (over the counter). The users of unregulated pesticides are not required to have a license, but are still subject to oversight to ensure proper use. Field Agents tended to agree with Extension Specialists, but one agent noted that a critical problem is unlicensed applicators. They are the ones who violate the regulations. EPA Region 4 respondents indicated that CTT helps, but its impact varies from state to state. Some states have bigger programs, offering lots of training. Also important to consider the number of inspectors, because the more inspectors in a

APPENDIX E: SUMMARY OF FINDINGS

Indicator/Measure	Stakeholders Discussing Topic						Finding/Result
	EPA HQ	USDA HQ	R4	State	Ext. Spec.	Ext. Agent	
							state the greater the perceived threat. The State Lead Agency staff thought that CTT helps. One state noted that they also publish a monthly newsletter with the names of violators and the types of violations committed.
What are the pros/cons of requiring classroom training?			x	x	x	x	Extension Specialists: Pros: Help applicators prepare for test, offer opportunity to ask questions, and cover many issues including safety issues. Cons: Too demanding on resources (financially difficult, staff time), could not meet demand or offer sufficient sessions to meet time constraints of all applicators. One respondent did not think that applicators would attend but provided the caveat that commercial applicators are more willing because of the market competition. Field Agents: Pros: Reach new applicators before they develop bad habits. Applicators will have a better sense of the regulations. Also, training would help with the test, otherwise likely to take test cold. Cons: Expense. EPA Region 4: Pros: Standard knowledge among applicators, basic understanding of rules, improve safety and protect human health and the environment. Improve pass rate. Cons: Funding, time, and waste of resources. Applicators can figure out regulations for themselves. State Lead Agency staff: Pros: Help nervous test takers, improve pass rate, improve compliance and safety. Applicators more in tune with regulations and familiar with material prior to exam. Cons: Resources strained, Extension Service could not handle demand, nor could they provide training in enough locations. May end up relying on training too heavily and not studying manuals. Applicators would say already know material and industry doesn't like being told they have to attend.

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Currently, how are program outputs and outcomes measured and tracked? Do partners feel that the current system is effective?	x	x	x				USDA HQ stated that states are required to report outputs and outcomes via PPRS reports. USDA is able to withhold money if do not report. EPA HQ said that the USDA reporting system provides the number of applicators trained and select responses to survey questions. Most of the information collected is outputs, not outcomes. It is unclear how this information is gathered. EPA Region 4 said that they only have outputs, no outcomes. Outputs tracked include number trained, number of certified applicators, number tested. Several EPA respondents noted that this system is not effective for identifying behavioral change.
How do partners assess whether they are meeting program goals?				x	x	x	Extension Specialists/Field Agents assess how whether they are meeting their goals by administering a post-training survey, reviewing violation data, keeping track of the number trained, review pass-fail rates, and soliciting feedback from agents. Field Agents noted similar methods of assessing whether they are meeting their goals. One respondent noted conducting oral quizzes during the training to get a sense for what attendees were absorbing. Another respondent stated that private applicators were given the certification test before and after training, the results of which helped them to understand the impact of the training. State Lead Agency staff said they reviewed complaints, violations, and staff performance (to extent related to program goals).
What information, if any, do partners receive about exam failure rates and violation rates. How is this information used?					x	x	Most Extension Specialists reported receiving pass-fail rates and use the information to re-examine the focus of training and the wording of test questions. One extension specialist stated that they do not alter the training based on the tests because the test takers always get the same questions wrong. Fewer Extension Specialists receive violation data. Several Extension Specialists that receive violation rates work with the State Lead Agency staff to alter training and testing materials and increase the emphasis on certain areas. One respondent noted that although s/he did not receive the data, s/he would like such information in order to develop case studies.

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							Most Field Agents said they did not receive pass/fail rates. One noted that s/he could get them if needed and another noted that s/he did in fact receive them. No Field Agents reported receiving violation data.
Are there ways to facilitate more measurable outcomes of program success?	x	x	x				Based on the data gathered in NC, it seems possible to connect applicators, training attendance, and violation data to better understand the impact of the program on compliance. IEc's report will present a model for how these connections could be made and offer an example using NC data.
How can program partners better support each other from a technical, financial, or other standpoint?	x	x	x	x	x	x	Extension Specialists made the following suggestions to their partners: regionalize training; increase funding and make levels more consistent; improve information exchange; provide additional program materials; integrate concerns of different government agencies (e.g., homeland security). Field Agents made the following suggestions to their partners: Provide more training materials; facilitate the sharing of materials; increase the uniformity/consistency of materials and regulations; offer in-service training. EPA HQ made the following suggestions to their partners: State partners could do a better job coordinating with one another. Interstate partnerships would be beneficial. Partners lobby EPA for money, but really need to lobby Congress. Partners need to attend meetings regularly. Coordinate more thoroughly with the region. EPA Region 4 made the following suggestions to their partners: Increase travel budget; connect disparate state databases; provide more information about where money is going and give Extension Specialists greater flexibility in how they use money. EPA HQ needs to be better connected to partners on the ground, they are disconnected from Agents. Measurement needs to be addressed. Cannot provide additional funding until can provide evidence of what we have accomplished. State Lead Agency staff made the following suggestions to their partners: Need more funds, particularly when update regulations. State needs money to update training materials and to enforce these regulations. Need money from USDA. EPA HQ needs to acknowledge/be aware of the "realities on the ground"; materials need to be shared; need EPA to shift focus to high hazard,

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							states waste time on low hazard chemicals that EPA has made priority; partners need to understand state programs.