

United States
Department of
Agriculture

Forest Service

Forest Health Protection

Forest Health Technology
Enterprise Team

Fort Collins, Colorado
FHTET-2004-16

December 2004

Aerial Application Safety Team Report: Issues and Recommendations



Photos courtesy of Butch Sayers,
West Virginia Department of Agriculture

Aerial Application Safety Team Report: Issues and Recommendations

Initiated at the Frederick, Maryland Workshop, April 2003

<i>FOREWORD</i>	<i>1</i>
<i>I. INTRODUCTION</i>	<i>1</i>
<i>II. ISSUES AND RECOMMENDATIONS</i>	<i>3</i>
<i>A. Program Management</i>	<i>3</i>
<i>B. AAST Information Dissemination</i>	<i>8</i>
<i>C. Gypsy Moth Program Contract Workshop (completed July 2003)</i>	<i>9</i>
<i>D. Risk Management and Additional Safety Issues</i>	<i>15</i>
<i>E. Security</i>	<i>19</i>
 <i>CHARTS:</i>	
<i>ACRES AND ACCIDENT SUMMARY</i>	<i>19</i>
<i>ACCIDENT SUMMARY: GYPSY MOTH AND WESTERN FOREST SERVICE PROJECTS, 1987 TO 2004</i>	<i>20</i>

FOREWORD

Aerial insecticide and herbicide application is one of the most challenging mission profiles in aviation today, and safety must be a major consideration in such operations. The majority of aircraft accidents in aerial spraying operations over the past 16 years has been due to pilot error. Clearly, responsibility for aviation safety begins in the cockpit. However, all personnel involved in aerial application projects, both government agency and contract employees, must work to ensure that the operation is as safe as possible, from the initial planning stages to the last day of operation. Safety on the job is the responsibility of everyone involved.

I. INTRODUCTION

USDA Forest Service administrators have concluded that the accident rate for aerial application projects has been too high. In 2002, the Director of Forest Health Protection (FHP) Robert Mangold and Assistant Director of Aviation Tony Kern requested FHP National Aviation Safety Manager Tim McConnell to create a committee to look into safety issues relating to aerial application projects. The Aerial Application Safety Team (AAST, the Team) was convened to identify areas of concern and draft recommendations for improvement in those areas. The AAST consists of aerial application specialists, state and USDA Forest Service gypsy moth eradication and suppression program managers, forest health managers, and aviation safety managers.

Tim McConnell chaired the Team during its formation in late 2002 and 2003. The Team met in April 2003 in Frederick, Maryland, to discuss safety issues, contracting specifications, and communication challenges. The following recommendations were developed to help improve the overall aerial application safety record. This report is a compilation of identified issues and team recommendations.

The report is organized into the following general categories:

- Program Management (Issues 1-10)
- AAST Recommendations Dissemination (Issues 11-12)
- Contract Workshop (Issues 13-26)
- Risk Management and Additional Safety Issues (Issues 27-36)
- Security (Issue 37)

While the issues address specific concerns, recommendations should be shared with all agency personnel involved in aerial application projects to promote safety awareness and communication. While most projects focus on the target or pest, it should be remembered that aerial application projects are fundamentally aviation operations and should be managed as such.

The 2003 Aerial Application Safety Team was made up of:

- Donald A. Eggen, Forest Health Manager, Pennsylvania Department of Conservation and National Resources, Harrisburg, Pennsylvania.
- Quentin “Butch” Sayers, Gypsy Moth Program Manager, West Virginia Department of Agriculture, New Creek, West Virginia.
- David R. Bridgwater, Project Development Specialist, USDA Forest Service, Forest Health Protection, Portland, Oregon.
- Kenneth T. Klein, Slow-the-Spread Technical Specialist, USDA Forest Service, Forest Health Protection, Blacksburg, Virginia.
- Tim McConnell, Aviation Safety Manager, USDA Forest Service, Forest Health Protection, Fort Collins, Colorado.
- Amy Onken, Forest Entomologist, USDA Forest Service, Forest Health Protection, Morgantown, West Virginia.
- Mike Quesinberry, Slow-the-Spread Biological Scientist, USDA Forest Service, Forest Health Protection, Blacksburg, Virginia.
- Rod Whiteman, Unit Aviation Officer, USDA Forest Service, Forest Health Protection, Morgantown, West Virginia.
- Dan Zimmerman, Northeastern Area Aviation Officer, USDA Forest Service, Forest Health Protection and Cooperative Fire Management, Newtown Square, Pennsylvania.

When originally created, AAST was to be only a short-term effort. After the Team’s meeting, the group realized that ensuring aerial operations safety required discipline and ongoing effort. Hence, the Team decided to retain the committee status and welcomed additional participants. Greater participation will strengthen the message of aviation safety and management for all aerial application projects.

II. ISSUES AND RECOMMENDATIONS

A. Program Management

1. Tracking Flight Hours

ISSUE: Incident/accident rates for aerial applications flights are not easily compared to those of general aviation because of the different measures used.

The aviation industry and government track flight histories by aircraft category and hours flown. Aviation mishaps (including incidents, incidents with potential serious consequences, and accidents) are also tracked using the aeronautical standard of the number of accidents per 100,000 flight hours. Agency aerial application projects, on the other hand, track their flight history by acres treated and number of accidents (flight operations conducted under Federal Aviation Regulations (FAR) Part 137: “Agricultural Aircraft Operations” are monitored independently of those operating under FAR Part 135: “Air Taxi Operators and Commercial Operators”). Government agency-contracted aerial application projects should track their flight histories by the number of hours flown so that these histories can be compared to that of general aviation as well as to other operations within the organization.

RECOMMENDATION: Begin tracking hours flown for suppression, eradication, and Slow-the-Spread (STS) projects so that accident rates can be compared to general aviation and to other aviation operations within the organization. This can be accomplished by pulling information from the load sheets for the state-sponsored projects. Some states already report this information to the central data clearing house in Morgantown, West Virginia, when reporting daily acres treated for pesticide use tracking.

2. Tracking Non-application Flight Hours

ISSUE: There are many non-application flight hours associated with aerial application projects that are undocumented even though they are just as mission-critical and important in terms of safety. The flights involve, among others, project-planning reconnaissance, pre-spray block reconnaissance, and aerial observation of spray applications during projects.

RECOMMENDATION: Project-related flight hours and accident data should be tracked in the same manner as similar aerial application-related data.

3. Additional Database Items

ISSUE: Descriptive information on flight accidents is incomplete. When viewing the accident summary database, the direct causes of accidents (striking aerial hazards, power failures, faulty aeronautical decision-making, etc.) are given, but not basic data or contributing factors, such as: time of day, elapsed flying time, meteorological conditions, operation (e.g., during-treatment versus ferrying), etc. More human factors information (such as the background and experience of the pilot involved in the accident, hours flown, etc.) can help program managers identify potential contributing factors and ongoing safety concerns.

RECOMMENDATION: Create and maintain a more detailed records database for Forest Health Protection-related aerial application programs.

4. Safety Reporting

ISSUE: The opportunity to emphasize project safety is not usually addressed at annual national meetings. Accidents are recorded by the National Transportation Safety Board (NTSB) and kept in their public-access database, but this information is not generally shared at agency meetings.

RECOMMENDATION: Incidents/Accidents/Mishaps should be reported every year and shared at the Annual Gypsy Moth Review as well as included on related websites, such as the Forest Health Protection Aviation website.

5. SAFECOM Education

ISSUE: Incident reporting via SAFECOMS is sporadic. The Aviation Safety Communiqué (SafeCom) database fulfills the Aviation Mishap Information System (AMIS) requirements for aviation mishap reporting within the USDA Forest Service. Categories of reports include incidents, hazards, maintenance, and airspace intrusions. The system uses the SafeCom Form FS-5700-14 (PDF format) to report any condition, observation, act, maintenance problem, or circumstance with the pilot or the aircraft that has the potential to cause an aviation-related mishap. Submitting a SafeCom is not a substitute for immediate "on-the-spot" correction of a safety concern. It is a tool used in the documentation, tracking, and follow-up of corrective action related to safety issues.

It has been noted that very few SafeComs are ever submitted on aerial application projects. The AAST feels that this is due to the fact that few spray project personnel are familiar with the SafeCom process, and this situation should be improved.

RECOMMENDATION: Educate project personnel of all agencies on the use of SafeComs.

6. Pilot Safety Training

ISSUE: Safety training across federal agencies is not consistent—to the detriment of aerial application. The Bureau of Land Management (BLM) provides annual pre-fire season training to contractors and pilots of single-engine air tankers (SEATs). The Blue Ribbon Panel for Forest Service Large Air Tanker Review (BRP) has recommended the training of air tanker flight crews by the Forest Service. Because the primary cause of aerial application accidents is *the human factor*, aerial application contractors and their pilots could benefit from government agency training. This training would not include how to do aerial application but would cover such topics as Forest Service and state policies and regulations, project organization, Aeronautical Decision Making, and the Professional Aerial Application Support System (PAASS), supported by the National Agricultural Aviation Research and Education Foundation. The PAASS program goals are to reduce the number of aircraft accidents and drift incidents associated with the aerial application of fertilizers and crop protection products.

RECOMMENDATION: Develop a course similar to BLM SEAT training for aerial application pilots that addresses risk management, human factors, aeronautical decision making, crew resource management, PAASS, and agency policy and regulations. Seek partnerships with aviation safety organizations that currently provide aviation safety training, such as the National Agricultural Aviation Association, universities, and private training contractors.

7. Gypsy Moth Project Plan Review and Approval

ISSUE: There should be more federal overview and an approval process of state-based plans involving aerial operations. In order to be part of the Gypsy Moth (GM) Cooperative Suppression and Eradication Projects Program and other suppression/eradication projects, each state program must meet the requirements in the Federal Guidelines for Participating State Agencies. Each program is required to provide plans for safety, work, and security.

RECOMMENDATION: Regional/Area Aviation Officers or their designate should approve all Project Work Plans, Project Safety Plans, and Project Aviation Safety Plans submitted for federal funding within their respective Region/Area. Project Security Plans should be reviewed by Jesus Cota, FHP WO.

8. Project Management Expertise

ISSUE: There is an ongoing need to develop expertise, provide training opportunities, and maintain project-level aviation experience for program managers. Often, aerial applications program management responsibilities are collateral duties of another management position. In years of reduced defoliation acreage and no aviation-related projects, there is little opportunity to update aviation project management techniques, contracting, and project organization, etc. In addition, several of the current program and project management personnel will be retiring in the next few years, further depleting the existing pool of expertise.

RECOMMENDATION: Provide program managers with opportunities to travel to other states in order to observe the administration of other projects and learn new management techniques. This may come in the form of invitations and travel funding. Promotion of a mentoring program for program and project managers will help maintain an adequate level of expertise.

9. Future Cooperative Forest Health Protection Aerial Application Safety Council

ISSUE: Safety considerations are not sufficiently integrated into the aerial operations culture for aerial reconnaissance and application projects. The task of the Aerial Application Safety Team (AAST) was to develop recommendations for aerial application project safety to reduce aircraft accidents, complete a final report, and implement the recommendations through education of state and federal program and project managers. The AAST members feel that their work is important, and that the team should continue to promote a culture of safety awareness in all government-sponsored aerial application programs.

RECOMMENDATION: Form a Cooperative Forest Health Aerial Application Safety Council (AASC) to emphasize and promote safety.

10. Lack of Standardized Position Qualifications for Aerial Application Manager

ISSUE: There are no standardized position qualifications for managing aerial application projects. Each Region and Area is organized to suit its own needs, developed from its unique history. Most FHP coordination of both federal and state gypsy moth programs comes from local field offices. Entomologists and forest health specialists in these offices have varying degrees of program and project expertise. Understanding positive project management and risk management, and promoting a “safety environment” are the minimum requirements for these positions.

RECOMMENDATION: The Aerial Application Safety Council should develop standardized role qualifications at the field-office level for aerial application program managers.

B. AAST Information Dissemination

11. Websites

ISSUE: The Internet is not used sufficiently to distribute important information on aerial operations safety. Websites have a tremendous amount of potential to provide interested people information on aviation safety issues. Forest Health Protection has two websites that should be utilized more: the Gypsy Moth website on the Northeastern Area, Morgantown website (www.fs.fed.us/ne/morgantown/4557/-gmoth), and the Forest Health Aviation website (www.fs.fed.us/aviation).

RECOMMENDATION:

- A. Post up-to-date AAST information on the gypsy moth website and the Forest Health Protection–Aviation website.
- B. Post federal guidelines for suppression projects on the gypsy moth website.
- C. Develop AAST recommendations into a PowerPoint presentation so that anyone can download the presentation from the web for their own use.

12. Other Methods to Promote Safety Concerns

ISSUE: Aviation safety information is sometimes distributed only selectively, whereas this information MUST be available to all project personnel. Some information is provided to aircraft users and managers in various formats, but not to other involved and affected personnel. Given that project safety affects all personnel, aerial application safety tips and ideas should be provided to ALL project personnel, at all levels.

RECOMMENDATION: Develop and distribute additional pocket guides and pamphlets similar in format to *Five Steps to a Safe Flight* (FS 5700-16 April 97, NFES 1399) and *Twelve Standard Aviation Questions That Shout ‘Watch Out!’* (NFES 1129, 1998).

C. Gypsy Moth Program Contract Workshop (completed July 2003)

13. Gypsy Moth Program and Project Positions

ISSUE: Currently, aviation safety considerations are sometimes given emphasis secondary to entomology considerations in aerial application spray projects.

Program managers need to consider that these projects are as much aviation projects as entomology projects and manage them as such—among other things, by including specific aviation positions in project organization and planning. Combining project entomologist and aviation manager responsibilities in one position on large projects can create a problematic workload and potential safety risks. These responsibilities should not be borne by the same individual.

RECOMMENDATION: Emphasize the safety importance of identifying the role of “Project Aviation Manager.” Identify other project positions and develop a training package emphasizing safety for all those positions.

14. Aerial Application Contracting

ISSUE: Because of inconsistencies in contract specifications that make oversight difficult, contracting concepts—such as ‘best value’ vs. ‘low bid contract’ vs. ‘end-product contract’—need to be clearly defined. Whereas all states have contract specification language, some do not have the ability to “negotiate” contracts and must accept low bids. It has been more than ten years since an organized aerial application contract workshop has been conducted to bring standardization and commonality across all state and federal contracts. This workshop should include an examination of Forest Service contract specifications for pilot experience—flight time and type of aircraft, GPS proficiency, contractor pilot training, contractor and pilot safety record, etc.

RECOMMENDATION: Conduct contract workshops.

15. Contract Administration

ISSUE: Often state and federal project personnel do not know or understand the contract specifications within their contracts or the requirements for contractor performance.

RECOMMENDATION: Contract/Project administrators and their staffs implement and enforce what is stated in their contracts.

16. Pilot Flight Hours and Duty Day

ISSUE: Flight-hour specifications for a duty-day do not always take into consideration the pilots other responsibilities, potentially creating an inordinately long pilot's workday. Many state and federal application contracts do not follow *Forest Service Manual 5700* for pilot flight time and duty day limits: a maximum of eight hours of flight time in a fourteen-hour duty day. Hours over that amount can be considered hazardous. A pilot's duty time needs to be clarified and managed. Flight-time limits should be written into all contracts to support safe operations.

RECOMMENDATION 1: All contracts should adhere to the *Forest Service Manual 5700* concerning pilot flight time, limited to eight hours of flight time in a fourteen-hour duty day.

RECOMMENDATION 2: Application pilots should not be allowed to do additional treatment work on other contracts until the contractor is released from the current government contract.

17. Operating Pressures Management

ISSUE: Self-imposed pressures in an awarded contract can put undue pressure on contractors and pilots. An example scenario: a contractor may propose using fewer aircraft to complete a job than specified in the invitation to bid in order to submit a lower price bid and win the job. In accepting this bid, the government agency puts additional pressure on the contractor by requiring the contractor to perform the work with fewer aircraft in the same amount of time. This places undue pressure on the application pilots and aircraft during the project, potentially causing hazardous flying conditions.

RECOMMENDATION: In all FHP-supported contracts, encourage following production rate specifications found in the model contract provided by State and Private Forestry, Forest Health Protection, when determining aircraft needs.

18. Production Rate Standards

ISSUE: Production rate standards are inconsistently cited in invitations to bid, therefore making comparison between bidders difficult. When writing contract specifications, some program managers do not know or use already developed production rates for specific aircraft, material, and volumes; these production rates should be standard across all programs and contract solicitations. Accepted production rates also give potential bidding contractors standards with which they can develop their proposals.

RECOMMENDATION: State and Federal personnel should be well trained in setting up contract specifications, including but not limited to the use of production rates standards. Regional FHP personnel should promote the use of the Forest Service-provided Spray Productivity Program (SP2) software.

19. Pilot Minimum Flight Hours for Insurance Coverage

ISSUE: Minimum flight hour experience for application pilots are not standardized.

RECOMMENDATION: Require minimum flight hour experience in all FHP-associated contracts to match minimum flight hour requirements specified in general pilot insurance contracts. Setting contract requirements to match general insurance requirements can also help contract administrators to rate contractor proposals, and can be used as technical evaluation criteria. Current pilot insurance policy requirements are:

- 2,000 hours agricultural treatment time,
- 200 hours turbine engine-type aircraft (if applicable), and
- 50 hours for the aircraft make and model.

20. Contractor Insurance Minimums

ISSUE: Often, pilots' insurance coverage amounts are outdated and may not be sufficient for current operations. Contracts often require old agricultural standard comprehensive insurance coverage. Much of the spraying for gypsy moth is done over populated (rural to urban) environments; therefore, the old standard is too low. It is important to carry much higher insurance amounts, understanding the higher potential financial risks associated with property damage and bodily injury when treating forests in populated areas.

RECOMMENDATION: Recommend that the required insurance should include the following coverages and minimum limits:

- Aircraft Liability: \$1,000,000 single limit for each occurrence for bodily injury and property damage, combined.
- Chemical Liability: restricted chemical category coverage at limits not less than:
 - \$100,000 bodily injury per person
 - \$300,000 bodily injury per occurrence
 - \$100,000 property damage per occurrence (this must include coverage for treating residential areas)

21. Project Personnel Communication

ISSUE: Frequently, communication among project personnel is ad hoc and not formulated to promote coordination and safety in the team. During aerial application projects, the challenges of biological and meteorological window constraints, production, spatial and organizational compartmentalization of government and contractor jobs, and other factors all make project communication difficult. Without planned and scheduled meetings, both government and contractor employees (including pilots) can easily become distanced from decision-making and information sharing, resulting in potentially hazardous decisions.

RECOMMENDATION 1: Promote communication processes involving all project personnel, including both government and contract personnel.

Communication is key to success in most projects; this is especially true where spray operations must consider changing weather, distant treatment blocks, scattered offices, and relocation of loading sites. One of the best ways to promote communication is by planning and scheduling regular meetings and sticking to the schedule (with some understandable flexibility). The following are six recommended meetings for all aerial application project personnel to follow:

1. Contract Pre-work (prior to flight): Early scoping meetings in which the contractor is informed of start dates, treatment blocks, special situations (e.g., school bus routes), limitations, flight hazards, and block-specific concerns, and which include other government agencies—such as US Fish and Wildlife requirements—will help all project personnel plan efficient and effective operations.
2. Project start (prior to flight): Regional concerns, block-specific concerns, flight hazards review, and communications review.
3. Early Pre-spray (prior to flight): Flight hazards review, safety, and coordination.
4. Day of Pre-spray (morning of treatment): Flight hazards review.
5. Daily Post-spray (review of day): An opportunity for all involved to provide information for planning the next day's operations with an emphasis on safety.
6. Post-Program (Project review and critique): Communicate lessons learned at the project assessment and critique to the aerial application community.

RECOMMENDATION 2: Include this guidance in contract training workshops.

22. Project Personnel Communication Responsibilities and Line of Supervision

ISSUE: Lack of role definition can short-circuit necessary communication.

Often project personnel are not sure when it is appropriate to share their thoughts, often feel they are not part of the decision-making process, and are reluctant to make suggestions on safety.

RECOMENDATION: Promote communication among project personnel by explaining each position's responsibility to the overall communication process.

Identify all project positions and promote efforts for greater communication between colleagues and project personnel. Include this guidance at upcoming contract workshops..

23. Additional Contract Workshop Training Subjects

ISSUE: A number of other topics related to the concerns already discussed should be addressed in training and operations.

RECOMMENDATION: Include the following subjects, and add additional relevant subjects as the workshop is planned and conducted:

- Contract elements
- Standardization
- Security requirements and recommendations
- GPS (onboard navigational systems) technology, pilot proficiency, and major safety pitfalls
- STS DGPS contract language for other contracts
- Contracting Officer or Contracting Officer's Representative responsibility for communicating direction and work with the contractor
- Attitude
- Exclusive-use contracts

24. Aircraft and Equipment Inspections

ISSUE: Lack of a standard inspection methodology can compromise contract aircraft and equipment readiness. Inspections should be complete and consistent from one project to another, and should be finished well before project start—not the day immediately before the project begins.

RECOMMENDATION: Create a standardized post-award aircraft and equipment inspection checklist. Review the West Virginia and Michigan checklists for examples. Include a checklist use and inspection methodology in the Contract Workshop.

25. Contractor Safety History

ISSUE: Positive reinforcement promotes continued safety awareness, but currently, there is no reward for a good safety history or increased safety records above contract minimums. A good safety record is a criterion for judging contractor performance that is not being used consistently.

RECOMMENDATION: Use contractor safety history as one method to evaluate past performance and 'best value' rating.

26. Risks of Low-bid Contract Award

ISSUE: When inadequate specifications are written into a contract, the low bid process can result in awarding a contract to a less-than-adequate contractor. In the contracting arena, the purpose of the low bid process is to promote sound fiscal management while meeting product requirements. It is imperative that government agencies prepare sound invitations to bid that effectively balance price, safety, quality, and performance.

RECOMMENDATION: During contract workshops, provide information on the critical elements that should be included in a contract's invitation to bid. These critical elements will greatly influence the quality of a contractor's bid. A sample contract will be available for all state cooperators to assist them in the development of an invitation to bid with sound specifications.

D. Risk Management and Additional Safety Issues

27. Managing Risk

ISSUE: Though risk management is considered part of the planning process, it is not always applied to all aspects of aerial application. It is a well-known fact that aerial application is one of the most risk prone forms of aviation. Like other high-risk activities, mitigation measures are implemented to manage those risks. Not only is the mission profile high risk, but also exposure risk (time) is very high.

RECOMMENDATION: Promote contract administrator's understanding and awareness of the importance of Risk Management in all aspects of contract administration.

28. Training and Organization

ISSUE: Most aerial application project organizations do not have a separate position titled "Project Aviation Officer/Manager" to oversee project safety issues. In projects where aviation coordination is considered, duties generally assigned to a Project Aviation Manager often become "collateral duties" for the Project Manager or Project Entomologist, people who often have little if any background in aviation. Certainly, the project objective is pest management but, from a perspective of project safety, the project is foremost an *aviation project*.

RECOMMENDATION: USDA Forest Service Forest Health Protection and state cooperators should take advantage of Interagency Aviation Training (IAT) instruction to define the role of the Project Aviation Officer/Manager for each project. IAT defines a series of aviation position titles and their respective qualification requirements. Using these predefined roles will ensure proper coverage of aviation safety concerns. Although training for all aviation positions are not yet available, some positions that are supported include: Project Aviation Officer/Manager, Unit Aviation Manager, Contracting Officer's Representative/Project Inspector, Aviation Dispatch, Administrative Staff, Agency Administrator, and Fixed-wing Manager.

Some on-line courses are available, and additional modules are in various stages of development. IAT sponsors seminars where individual modules are presented within a full week's classwork. Students can sign up for the modules required for their aviation position or title.

According to information available online at <http://iat.nifc.gov>

"The Interagency Aviation Training (IAT) Program offers training for all state and federal agencies that utilize aircraft in support or accomplishment of their programs and projects. The interagency-wide goal is to accomplish safe, efficient, and effective utilization of aviation resources. Increasing employee awareness of agency policy, procedures, and safe practices must receive high priority. Aviation

training, whether basic safety, specialized, or management, is a method to increase this awareness and a key to meeting this goal.”

Support and coordination for IAT training for state and federal employees involved in aerial application projects is the responsibility of the FHP Aviation Safety Manager.

29. General Project Pressures

ISSUE: Pressures tend to build on most projects as the days and weeks go by—especially when weather, logistical, biological, and organizational delays exist. These include a mix of self-induced, incidental, and management pressures affecting personnel, including:

- Wanting to get the work done quickly for personal or project reasons
- Production or performance pressures
- Temptation to cut corners to speed up the work
- Frustrations arising from personal interactions
- Unrealistic or unmanageable workloads
- A sudden overwhelming urge to finish
- Contract management conflicts
- Contractor pressures:
 - Pressures to get to the next contract
 - Concern about profit margin
 - Frustrations due to personal interactions

Often, projects become mere chores or redundant processes. Complacency develops even prior to the start of the project—especially in long-running annual projects. Generally, spray projects begin in the early morning hours, and most project personnel do not get an adequate amount of sleep. This lack of sleep can exacerbate existing project pressures.

RECOMMENDATIONS: Project management must watch for, and be aware of, symptoms of pressure on project personnel. If the project manager is “burned out,” it’s reasonable to assume the field crews are too. Projects of any great length may need a “time out” or should “stand-down” for a day or two at some point during the project to rest and regain focus. Most likely, time-outs will happen later in the project when project personnel are feeling the cumulative affects of pressures listed above. Time-outs could include an “all-hands” meeting to reinforce safety as the number one goal.

30. Additional Project Pressure

ISSUE: Pressure to finish an aerial application can lead to flight operations during less-than-optimal times. In order to increase daily production, sometimes project management will conduct an aerial application in the evening as well as in the early morning. When weather doesn't allow early morning applications, the project typically waits for favorable weather in the late morning, but when late-morning weather does not cooperate, it is tempting to try to complete an application in the early evening during less-than-optimal flight times. This practice of waiting an entire day for a break in the weather often tires both pilot and project staff, creating potentially hazardous operations.

RECOMMENDATION: Maintain a predictable flight schedule that allows for project personnel to get proper rest.

31. Specific Project Pressure

ISSUE: Other needless pressures are self-imposed by project personnel. One scenario: Poor organization by project management can put undue pressures on the application pilot to get more work done during the day than time allows. This can lead to, or exacerbate, cockpit frustrations felt by the pilot.

RECOMMENDATION: Develop project management guidelines to help reduce undue pressure on application pilots and other project personnel, including rules and responsibilities by position. Reducing pressure reduces risk.

32. Safety Responsibility

ISSUE: Responsibility for aviation safety on an aerial application project is sometimes deferred to a single project position.

RECOMMENDATION: Safety concerns must be promoted independent of role. Before and during aerial application projects, management should ensure that all employees know they are ALL empowered to be Safety Advisors, whereby anyone can ask to stop operations to regroup or rest, or get questions answered and issues resolved. Both government and contractor employees' safety and welfare comes before production and mission.

33. Displaying Aerial Hazards on Onboard Navigation System Monitors

ISSUE: Technology development in cockpit equipment brings up concerns about comparative clarity and personal preference. For example, some onboard navigation systems have black and white monitors while newer versions have color monitors: which is adequate and what is appropriate for spatially depicted aerial hazards, such as power lines and cell towers, may be a matter of personal preference.

RECOMMENDATION: Encourage the person on the project acting as aviation manager working with the contract pilots to address the pilot's needs on equipment issues. Some pilots prefer hazards be displayed spatially, while some do not. Some feel it clutters their screen, while others want them shown because they can be represented in red, making them easily recognizable for what they are. Some prefer a large paper project hazard map and rely on their reconnaissance flight prior to treating the block to identify hazards. Aerial hazards are the primary safety issue on aerial application projects and should be managed with the utmost diligence at all levels: this is a navigation safety issue, and it is at the pilot's discretion as to how best to manage it.

34. Pilot Complacency

ISSUE: Even very good pilots who fly many hours may become complacent during aerial application work. Routine promotes inattention.

RECOMMENDATION: Look for opportunities to address pilot complacency during aerial application projects, such as reminding pilots to stay alert and to be aware of the situation. Develop management techniques for awareness promotion, and teach project managers these skills at contract trainings.

35. Technology Pitfalls

ISSUE: Additional equipment and instrumentation in the cockpit may be distracting. Technology, such as the GPS in the cockpit, is commonplace in the aviation industry; nevertheless, it increases cockpit workload. Such equipment is a greater distraction for new pilots, part-time pilots, and pilots in training. For some pilots, such technology is unfamiliar, and its use generates more stress. GPS use, specifically, can also engender higher production expectations, which also increases stress on pilots.

RECOMMENDATIONS: Consider increasing minimum hours for pilots in both application hours and GPS training and use. It's not enough to just ask if they "know how to use the system": demonstrable proficiency is necessary as GPS contribution to aerial application navigation is not automatic. Also consider having each pilot provide printouts of previous aerial application work to demonstrate proficiency in use of on-board navigation systems.

36. Airspace Management

ISSUE: Controlled or restricted airspace near the project area can complicate flight planning and completion. Some aerial application projects occur in or near Military Training Routes (MTR) or Temporary Flight Restricted (TFR) areas, where aviation may be forbidden.

RECOMMENDATION: Ensure that someone on the aerial application project is responsible for managing the aspects of airspace and security. The application pilot is responsible for checking TFRs daily on all aerial application projects.

E. Security

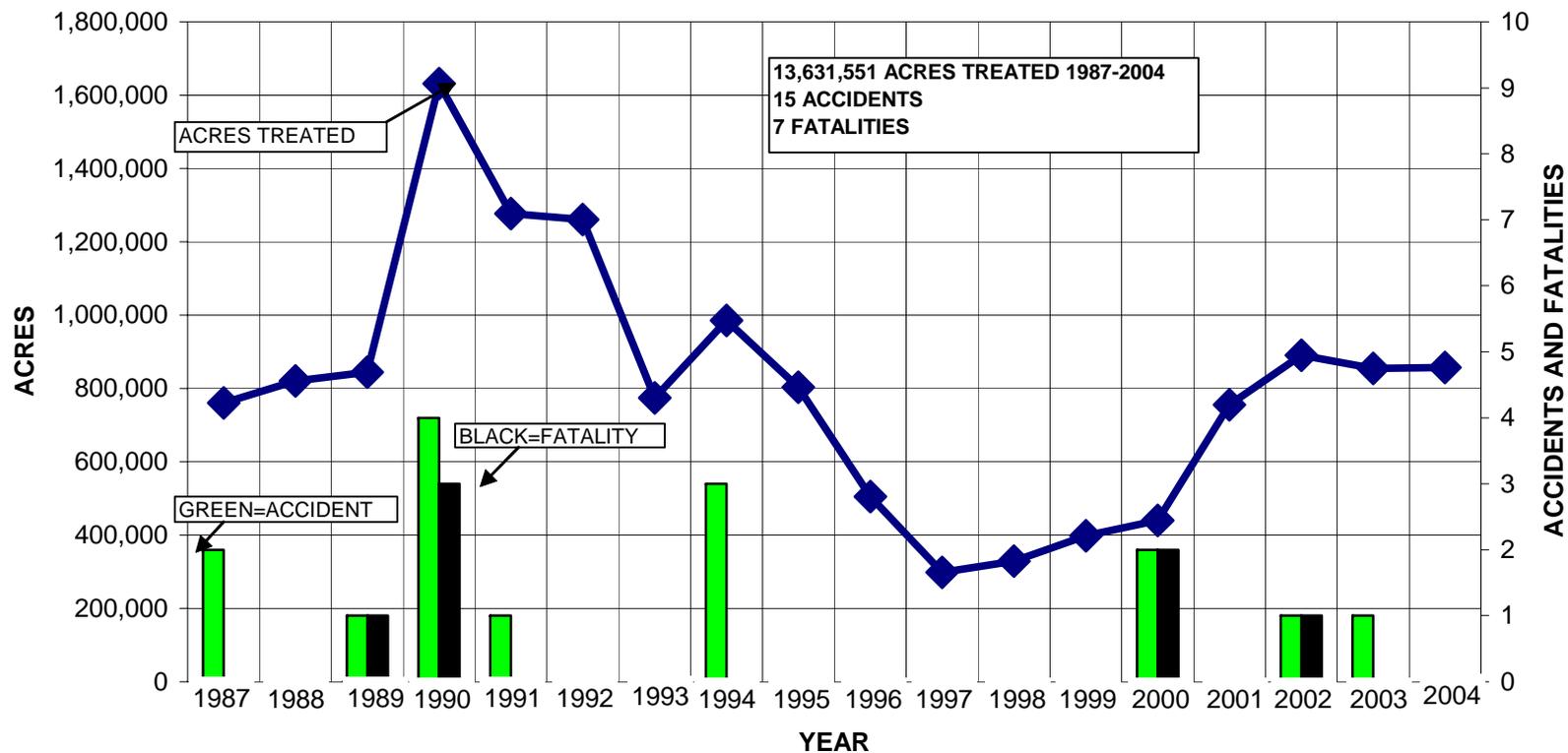
37. Security Insecurity

ISSUE: Security issues are fluid and changing, and there are many questions about aviation security that are yet unanswered. Such things as pilot background checks, national security alert status (and its restrictions), and project coordination reporting are examples of developing issues, and definitive guidelines are not always available.

RECOMMENDATION: Develop a notification strategy to share security issue information (including the National Security Plan) so that all project managers quickly get the same information. Work closely with Scott Cochran, Forest Service Airspace and Security Specialist (tschochran@fs.fed.us) for the eastern US and Jesus Cota (jcota@fs.fed.us) for WO Forest Health Protection Pesticide Specialist for Security.



ACRES AND ACCIDENT SUMMARY



Accident Summary Gypsy Moth and Western Forest Service Projects 1987 to 2004

Date	Town or area	State	Fatal	Tail #	Aircraft Model	NTSB ID #	Probable cause	Activity
6/26/2003	Dublin	VA	0	N4506L	Air Tractor 402A		Engine failure	During treatment
5/19/2002	Swanton	MD (WV)	1	N88MQ	Ayres S-2R	IAD02FA052	Struck powerline	During treatment
5/20/2000	Muskegon	MI	1	N178RA	M-18A Wsk Pzl Mielec	CHI00FA139	Struck tree tops	During treatment
5/16/2000	Frenchville	PA	1	N52AG	Bell UH-1H	NYC00FA136	Struck trees, then hillside	Ferry to block
5/4/1994	Osage	AR	0	N90469	Hiller UH-12E	FTW94LA144	Fuel exhaustion	Ferrying back
5/31/1994	Garret Co.	MD	0	N121CD	Bell 47 Soloy		Mechanical	During treatment
6/2/1994	Muskegon Co.	MI	0	Unknown	Turbine Ag Cat		Mechanical	During treatment
5/15/1991	Hughesville	PA	0	N2619B	Bell 47-G3B1	NYC91DGT03	Loss of engine power	Ferrying back
5/8/1990	Blair Co.	PA	0	N2369	Air Tractor		Struck powerline	Final pass during treatment
5/8/1990	Loudin Co.	VA	0	Unknown	Turbine Thrush		Engine failure	
5/23/1990	Hunlock Cr	PA	1	N913X	Grumman G-164A	NYC90DHA01	Struck powerline	Flying down river
5/19/1990	Capon Br	WV	2	N1FN	Douglas DC-3	BFO90FA046	Struck powerline	Flying down river
6/00/1990	Yakima IR	WA	0	Unknown	Huey	None	Engine failure	Ferrying
5/22/1989	Oldtown	MD	2	N508SC	Bell UH-1B	BFO89FA033	Struck shield cables	During treatment
6/00/1988	Warm Springs	OR	1	Unknown	UH1B	None	Engine failure	Ferrying
5/23/1987	Mullica Hill	NJ	0	N2412X	Piper PA-36-400	NYC87DHD05	Stall to avoid powerline	During treatment
5/8/1987	Lavale	MD	0	CGDFQ	Ayres 52R34	BFO87LA034	Struck high tension line	During treatment