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National Wildfire Coordinating Group

NWCG Standards for Aerial Supervision

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The *NWCG Standards for Aerial Supervision (SAS)* establishes standards for aerial supervision operations for national interagency wildland fire operations. These standards:

- Promote safe, cost-efficient, and effective aviation services in support of agency and interagency goals and objectives.
- Support standardization of aerial supervision operations, training, certification, and currency.
- Standardize aerial supervision mission procedures to enhance safety, effectiveness, efficiency, and professionalism.
- Provide guidance on aerial firefighting strategy, tactics, and risk management.
- Provide or reference other performance support materials for aerial supervisors.

Supplemental documents for the *NWCG Standards for Aerial Supervision*, PMS 505, are found at https://www.nwcg.gov/publications/pms505. These documents are separate to enable the use and editing of forms and logs as appropriate.

The National Wildfire Coordinating Group (NWCG) provides national leadership to enable interoperable wildland fire operations among federal, state, Tribal, territorial, and local partners. NWCG operations standards are interagency by design; they are developed with the intent of universal adoption by the member agencies. However, the decision to adopt and utilize them is made independently by the individual member agencies and communicated through their respective directives systems.

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Chapter 1 – Aerial Supervision Administration, Roles, and Responsibilities

Program Administration

Agencies are responsible for oversight and management of their agency's aerial supervision program. To achieve a cohesive and highly standardized interagency program, the following roles and responsibilities of interagency program management are provided.

National, Regional, State, County, Cities, and Military Agency Program Managers

Program managers are delegated by their respective agencies and are responsible for administering the agency's aerial supervision program. Interagency scope of responsibilities should include:

- Coordinate with other agency program managers, the Interagency Aerial Supervision Subcommittee (IASS), Interagency Airtanker Board (IATB), and Interagency Geographic Area Coordination Center (GACC) representatives to provide program coordination on an interagency basis.
- Coordinate with other agency program managers, the IASS, and interagency GACC representatives to maintain and update a national resource qualifications list to include trainees, qualified personnel, evaluators, and final evaluators.
- Ensure agency training and currency requirements are met. Annually review mission and qualification summaries.
- Participate in interagency working groups, committees, and subcommittees such as the Interagency Helicopter Operations Subcommittee, the Single-Engine Airtanker Board (SEATB), IATB, and the Interagency Airspace Subcommittee (IASC).
- Coordinate training at the national or geographic level.
- Manage evaluators and final evaluator designations and qualifications to meet agency quality assurance, standardization, and training objectives.
- Coordinate with trainee's unit and agency to track training progression and on-the-job training (OJT) needs.
- Ensure coaches are assigned to trainees.
- Provide quality assurance and oversight of operational and training performance standards.
- Distribute aerial supervision program-related information on an interagency basis.
- Coordinate with agencies that have a desire to develop or enhance an aerial supervision program.
- Coordinate operational standards with international cooperators.
- Provide input to the revision of the *NWCG Standards for Aerial Supervision* (*SAS*), PMS 505, https://www.nwcg.gov/publications/pms505, and the interagency training management system.
- Additional roles and responsibilities may be assigned based on agency-specific needs.

Geographic Area Coordination Center (GACC) Aerial Supervision Representatives

Aerial supervision specialists, assigned by the GACC, coordinate geographic aerial supervision needs and provide quality assurance oversight of:

GACC Representatives

Should be recommended on a rotational basis and delegated in writing.

Scope of Duties

- Serve as geographic area interagency aerial supervision point of contact.
- Coordinate with agency program managers and Geographic Area Training Representatives (GATR) to coordinate suitability flights, quality assurance observation flights, final evaluation flights, and training of federal, state, and local agencies.
- Make recommendations concerning training priorities to agency program managers and GATRs.
- Assist the GACC aircraft coordinators with tactical aerial supervision information and recommendations.
- Coordinate with agency program managers to ensure training is concurrent and cohesive, and that curriculum is aligned with operational standards and are satisfied on a national level.
- Provide input to the revision of the SAS and interagency training management system.
- Participate during the IASS working group meetings.

Aerial Supervision Working Groups

There are three sub-groups of the IASS which provide subject matter expertise and technical assistance to meet IASS assigned tasking. Each group is managed under a charter from IASS.

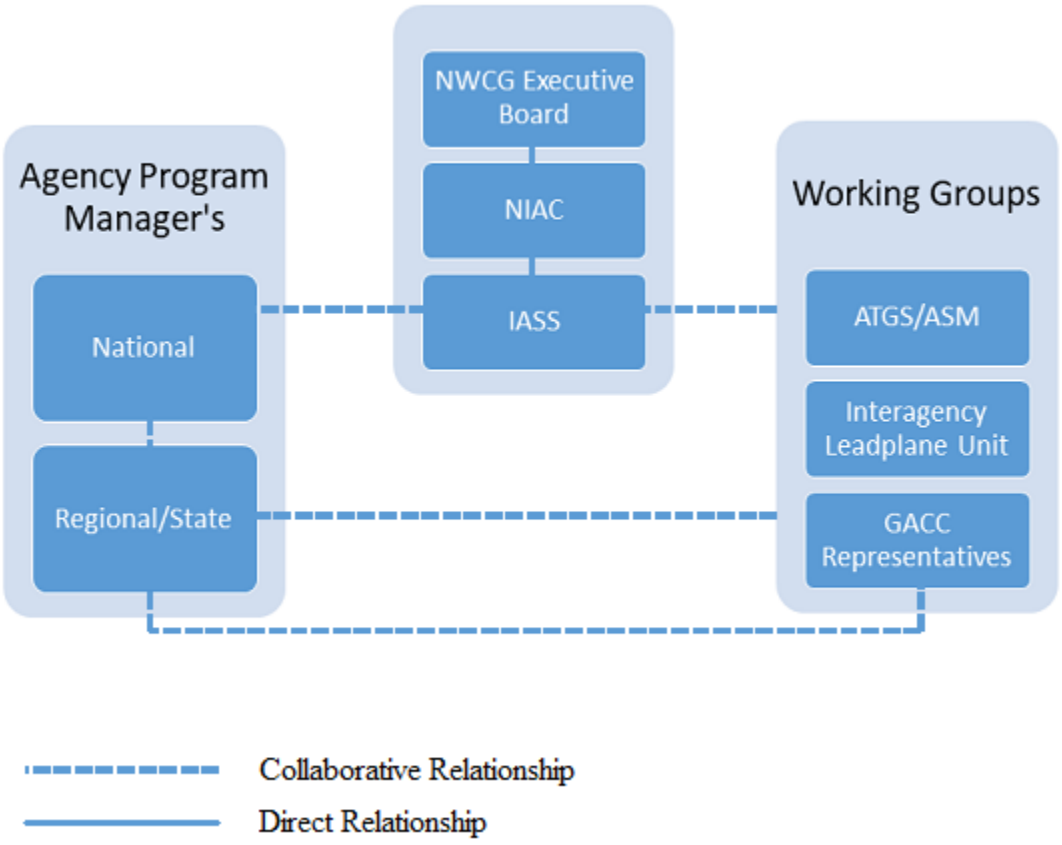
Chair and Co-chair:

- Serve as the point of contact for the IASS and manage the working group.
- Serve as the subject matter expert (SME) during IASS meetings and deliberations.

Working Group Members:

- Air Tactical Group Supervisor (ATGS) and Aerial Supervision Module (ASM) – national, regional, and state
- Agency Leadplane Pilot (LPIL)
- GACC representatives (delegated) or program managers

Figure 1. Interagency Aerial Supervision Relationship Diagram



Aerial Supervision Resources

There are four types of aerial supervision resources and four aerial supervisor Incident Command System (ICS) positions. Although these positions are unique, they share the common purpose of facilitating safe, effective, and efficient air operations in support of incident objectives.

Air Tactical Group Supervisor (ATGS)

The ATGS coordinates incident airspace and manages incident air traffic. They are airborne firefighters who coordinate, assign, and evaluate the use of aerial resources in support of incident objectives. The ATGS is the link between ground personnel and incident aircraft. They must collaborate with ground personnel to develop and implement tactical and logistical missions on an incident. The ATGS must be proactive in communicating current and expected fire and weather conditions and provide candid feedback regarding the effectiveness of aviation operations and overall progress toward meeting incident objectives. The ATGS must also work with dispatch staff to coordinate the ordering, assignment, and release of incident aircraft in accordance with the needs of fire management and incident command personnel.

On Initial Attack (IA) incidents (Type 4 and 5), the ATGS will size-up, prioritize, and coordinate the response of aerial and ground resources until a qualified incident commander (IC) arrives. On complex incidents (Type 1, 2, or 3), the ATGS will coordinate and prioritize the use of aircraft between several divisions or groups while maintaining communication with operations personnel and both fixed and rotor aircraft bases.

In ICS, the ATGS works for the IC on IA and the Operations Section Chief (OSC), Air Operations Branch Director (AOBD), or operational designee on extended attack. The ATGS supervises the LPIL, ASM, and the Helicopter Coordinator (HLCO) positions when activated. The ATGS may operate from an airplane or helicopter.

Aerial Supervision Module (ASM)

An ASM consists of an Air Tactical Pilot (ATP) and Air Tactical Supervisor (AITS). An ASM can be utilized as an LPIL, ATGS, or both, depending on the needs of incident management personnel.

ATP – The ATP is a qualified LPIL who has received specialized training and authorization to function as an ASM crew member.

AITS – The AITS is a qualified ATGS who has received specialized training and authorization to function as an ASM crew member.

LPIL – The LPIL coordinates, directs, and evaluates airtanker operations. When an ATGS is assigned, the LPIL is a subordinate to the ATGS position. If no ATGS is present, the LPIL works for the IC, OSC, AOBD, or designee.

A LPIL can increase the safety and effectiveness of an operation by assisting the ATGS through management of the airtankers assigned to an incident. The LPIL is authorized for low-level flight operations.

Leadplane Pilot (LPIL)

The LPIL position is qualified and authorized for low-level operations. The low-level capabilities of a leadplane enhance the safety and effectiveness of airtanker operations in the often turbulent, smoky, and congested fire environment.

Helicopter Coordinator (HLCO)

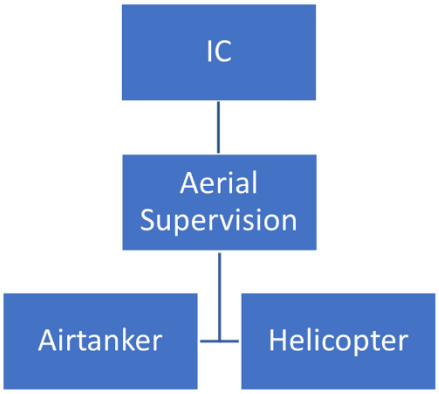
The HLCO coordinates, directs, and evaluates tactical and logistical helicopter operations. This position is responsible for establishing and managing the fire traffic area and temporary flight restrictions in the absence of the ATGS. The HLCO position should be activated whenever necessary or beneficial for the ATGS when only helicopters are assigned or in instances where visibility from smoke is a limiting factor for fixed-wing effectiveness. When an ATGS is assigned, the HLCO is a subordinate position to the ATGS. If no ATGS is present, the HLCO works for the IC, OSC, AOBD, or designee.

The HLCO is an integral part of the helibase briefings and operational tempo regarding helicopter resources.

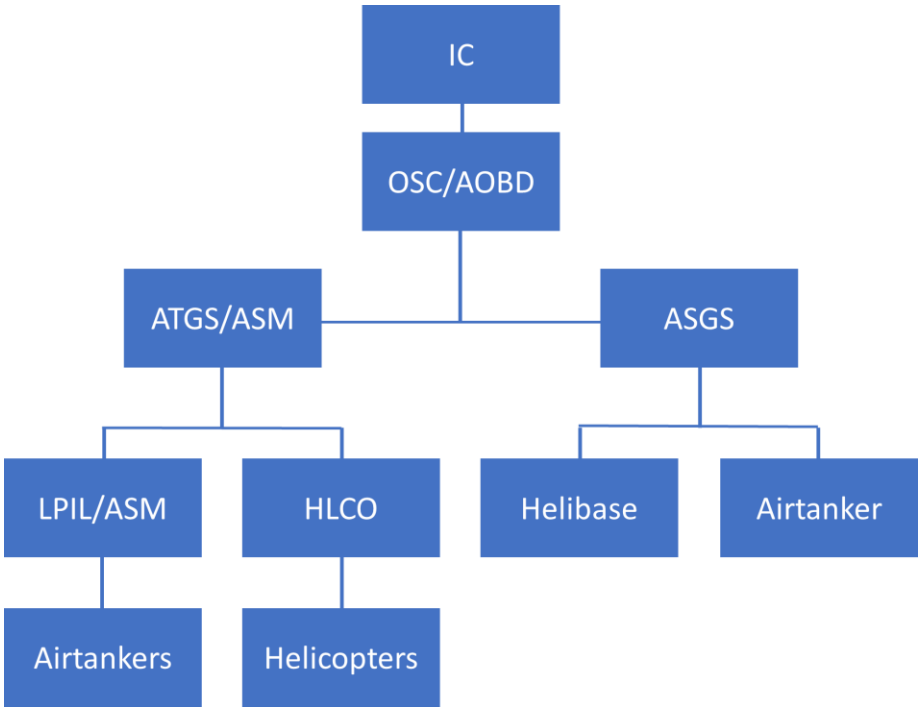
Note: Only aircraft with required radio configurations should be used for the HLCO mission. The following chart depicts the relation of aerial supervision to other resources in ICS.

Figure 2. Aerial Supervision organization during Initial Attack and Extended Attack

Initial Attack



Extended Attack



Chapter 2 – Training, Certification, and Currency

The policies governing training, certification, and currency shall comply with the employee's agency policy requirements. Additional requirements described within this guide shall be considered recommendations unless specifically adopted by the applicable agency as policy. The purpose of any additional requirement or standard is to achieve the highest level of safety and performance.

ATGS

Aerial supervision operations place a high demand on communication and management skills. Application of fire behavior knowledge combined with ground fire resource capability must be correlated with tactical aircraft mission planning.

ATGS Position Duties

- Coordinate and evaluate the safe and effective use of aircraft in support of incident objectives.
- Coordinate incident airspace and manage incident air traffic.
- Collaborate with ground personnel to develop and implement tactical and logistical missions on an incident.
- Communicate current and expected fire and weather conditions based upon continuous observations of the area.
- Provide candid feedback regarding the effectiveness of aviation operations and overall progress toward meeting incident objectives.
- Work with dispatch staff to coordinate the ordering, assignment, and release of incident aircraft in accordance with the needs of fire management and incident command personnel.

ATGS Initial Training, Certification, and Currency

Candidates will meet prerequisite experience requirements and mandatory training requirements listed in the *NWCG Standards for Wildland Fire Position Qualifications*, PMS 310-1, https://www.nwcg.gov/publications/pms310-1/nwcg-standards-for-wildland-fire-position-qualifications-pms-310-1. The United States Department of Agriculture, Forest Service (USFS) employees will meet the prerequisite experience requirements and mandatory training requirements in the *Forest Service Fire and Aviation Qualification Guide*, FSM 5700, and FSH 5709.16.

ATGS Classroom Training

Aerial Supervision (S-378); Air Tactical Group Supervisor (ATGS) qualification; state and local government OR National Aerial Supervision Training Academy (S-378) OR California Aerial Supervision Academy (S-378).

Note: USFS and Department of the Interior (DOI) employees must attend and pass the National Aerial Supervision Training course or the California Aerial Supervision course before performing OJT as an ATGS or HLCO trainee.

ATGS Agency Approved Crew Resource Management (CRM) Training

- Federal and federally sponsored Administratively Determined (AD) employees will complete the USFS Crew Resource Management 7 Skills (N-9059), facilitated by an authorized instructor.
- State employees will follow state CRM training requirements.

ATGS Mission Training Requirements

The flight training program should include a variety of work experience and be of sufficient duration to ensure that the individual can independently function as an ATGS following certification. Requirements include:

- Observing an ATGS evaluator during ongoing incident operations.
- All OJT will be under the direct supervision of an ATGS evaluator in the same aircraft.
- Before final certification, candidates must undertake an OJT program under the supervision of an ATGS evaluator that provides a variety of experience in initial and extended attack scenarios.
- Attend refresher RT-378, Air Tactical Group Supervisor Refresher/RT9059F, Crew Resource Management 7 Skills – Refresher (USFS) triennially after the initial attendance of S-378/N9059.

ATGS Candidate Evaluations

- After completing all missions, the candidate shall receive a written and signed evaluation from the ATGS evaluator as an integral part of the mission de-briefing. Multiple missions during a single day may be combined in one form.
- The *Aerial Supervision Mission Evaluation (ATGS/HLCO)*, PMS 505h, is the standard performance assessment tool.
- The candidate will retain a copy of the mission evaluation to supplement information completed by the ATGS evaluator in the candidate's Position Task Book (PTB).

ATGS Training Opportunities

Agency program managers can assist in the development of candidates by assigning a coach and providing a variety of training opportunities in different locales with varying fuel types and incident complexities. Training opportunities include the following:

- Obtain assignments to work with a full-time, dedicated, and exclusive-use ATGS at an air attack base.
- Obtain assignments to assist a national or geographic area Incident Management Team (IMT).
- Obtain details or training assignments in other geographic areas to increase the depth of experience.
- Participate as a passenger in other tactical aircraft during missions. Participation is subject to approval from the national program manager, regional aviation manager (RAO), contracting officer, contractor, and pilot-in-command (PIC).

ATGS Certification Process

Upon completion of the PTB, the agency final evaluator will:

- Complete a final *Aerial Supervision Mission Evaluation (ATGS/HLCO)*, PMS 505h.
- Return the completed PTB to the ATGS trainee along with recommendations.
- Notify the appropriate agency program manager.

The trainee is responsible for submitting their completed PTB, training documentation, and final recommendation to the certifying official.

ATGS Supplemental Training

The following training opportunities should be considered before initial certification or as supplemental or refresher training for individuals currently certified as ATGS. The GACC representative, agency program manager, or training official can assist in the development of candidates by providing a variety of training opportunities in different locales with varying fuel types and incident complexities. Related aviation training opportunities should be made available to candidates to provide valuable knowledge, experience, and skills applicable to ATGS. Training opportunities should include the following:

- Completion of pinch hitter pilot course
- Completion of private pilot ground school
- Completion of National Aerial Fire Fighting Academy (NAFA and NAFA II)
- Participation in aerial reconnaissance or aerial detection missions
- Observation of, or participation in, large helibase operations
- Orientation to airtanker base and retardant operations
- Orientation to or observation of aircraft dispatch operations
- Completion of assignments working with full-time, exclusive use ATGS at an air attack base
- Peer-to-peer observation and cross training is recommended
- Completion of assignments to a national or geographi*c* area IMT.

ATGS Currency Requirements

All ATGS will meet the requirements stated in the *NWCG Standards for Wildland Fire Position Qualifications*, PMS 310-1, and forward an annual mission summary to the appropriate agency program manager or RAO.

In addition:

- Triennially perform, document, and report a minimum of 15 missions. Failure to maintain ATGS mission currency requires a passing evaluation by a final evaluator on an actual or simulated mission.
- Document each mission as a "shift" in the appropriate qualification management system.
- Attend a triennial RT-378. Attend a triennial RT9059F,Crew Resource Management 7 Skills Refresher or agency approved CRM refresher course.
- Recertify – See *NWCG Standards for Wildland Fire Position Qualifications*, PMS 310-1, or agency-specific policy.

Quality Assurance

Agency program managers may request a quality assurance (QA) assessment. QA evaluations may occur during RT-378 or over an incident.

The request will be made from the program manager to the GACC representative, and a final evaluator will perform the QA assessment as an evaluation flight and document using the *Aerial Supervision Mission Evaluation (ATGS/HLCO)*, PMS 505h.

Note: USFS qualified ATGSs must meet the Forest Service Fire and Aviation Qualifications Guide and the *NWCG Standards for Wildland Fire Position Qualifications*, PMS 310-1, for ATGS currency unless more restrictive requirements are established within operating plans approved by the regional forester and Fire and Aviation Management (FAM) staff. California Department of Forestry and Fire Protection (CAL FIRE) supports the above currency requirements and manages them internally.

Air Tactical Group Supervisor Refresher Training (RT-378)

Required Elements

- Complete proficiency exercise
- Review applicable agency policies
- Review risk management and system safety
- Review mission procedures
- Review Fire Traffic Area (FTA) management
- Understand fire and aviation weather
- Review lessons learned and case studies
- Complete agency approved CRM refresher
    - Federal and federally sponsored AD employees will complete the RT9059F, Crew Resource Management 7 Skills – Refresher (USFS) (1.5 hours minimum) facilitated by a federally authorized instructor.
    - State employees will follow state CRM training requirements.
- Know helicopter coordination terminology and work with HLCO (refer to Unit 12 – Helicopter Coordination, National Aerial Supervision Academy course or CAL FIRE equivalent).

Optional Elements

- Become familiar with radio programming
- Become familiar with map reading and navigation
- Understand strategy and tactics
- Review aviation incidents and accidents from the preceding season
- Review payment documents
- Review contract and aircraft fleet updates
- Review issues and concerns from national and regional user groups (for example, fire management, dispatch, hotshots, ICs)
- Practice communication brevity
- Become familiar with electronic flight bags and proficiency exercise

All ATGS will demonstrate proficiency in the required refresher elements and complete a moderate complexity mission (a mix of at least four fixed and helicopter aircraft), or Sand Table Exercises (STEX). Students will be evaluated utilizing the *Aerial Supervision Mission Evaluation*, PMS 505h.

The exercise will represent a typical IA and will require the ATGS to demonstrate the minimum acceptable skill set of the position including FTA entry, determine FTA altitudes, attend initial aircraft briefings, understand aircraft separation, communicate with air and ground resources, and practice situational awareness. Use *Aerial Supervision ATGS Refresher Training Exercise*, PMS 505b, for guidance.

Performance will be documented on an *Aerial Supervision Mission Evaluation*, PMS 505h, reviewed with the participant, and a copy will be forwarded to the appropriate agency program manager. Failure to demonstrate an acceptable level of proficiency (a rating of 4) for the six required evaluation elements will require the ATGS agency-specific performance deficiency or decertification process to be implemented.

Documentation packet (or agency record of completion) will be issued to attendees who complete the refresher. Documentation will be forwarded to the appropriate agency program manager and the training official.

ATGS Mission Evaluation

The standard method for evaluating ATGS performance is an actual mission utilizing the *Aerial Supervision Mission Evaluation*, PMS 505h. ATGS evaluators and final evaluators conduct mission evaluations for the following purposes:

- ATGS training
- ATGS certification
- ATGS currency
- ATGS performance deficiencies

ATGS Performance Deficiencies

If an ATGS is observed performing unsafely or deficiently:

- The written deficiencies will be provided to the ATGS GACC representative and supervisor.
- The event and written deficiencies will be discussed with the individual and documented. Documentation should consist of recommendations on how to bring ATGS up to currency standards.

The recommendations will be forwarded to the appropriate RAO or agency program manager, and the individual's supervisor, sponsoring agency, or official. The ATGS may be made unavailable for ATGS assignments in the appropriate dispatch status system until the certifying official reviews the recommendations.

ATGS Coach

ATGS coaches serve as a point of contact and SME for trainees throughout the training process.

Position Requirements

Coaches must be a currently qualified ATGS

Responsibilities

- Help develop a training plan for the candidate.
- Coordinate with the agency program manager and employee supervisor.
- Ensure training is on track and that all requirements are scheduled to avoid delayed progress.
- Assist with any problems regarding agency and training requirements.
- Coaches should be an independent, nonpartisan person outside the employee's standard chain of command.

ATGS Evaluator

ATGS Evaluators should provide consistent ATGS instruction, evaluation, and feedback on ATGS missions.

Position Requirements

- One year following ATGS qualification while maintaining currency.
- Attend a regionally sponsored ATGS evaluator workshop. Documentation shall be forwarded to the appropriate GACC representative or agency official.
- ADs are authorized for this position if they meet the position requirements.
- Maintain ATGS currency as defined by the agency's training policy.
- The agency program manager or appropriate RAO will track ATGS evaluators. State agency aviation program managers can designate state-employed ATGS evaluators.

Responsibilities

- Utilize applicable methods to promote ATGS trainee progress and certification.
- Utilize training aids, best practices, forms, and policy documents to maximize the training experience.
- Conduct ground training exercises.
- Review and complete applicable PTB elements.
- Document strengths and focus on improvement areas utilizing the *Aerial Supervision Mission Evaluation (ATGS/HLCO)*, PMS 505h.
- Provide feedback to the trainee's supervisor, coach, or both.
- Share progress reports with trainee's GACC representative.
- Coordinate with the trainee's supervisor to recommend and schedule the final evaluation flight.

ATGS Evaluator Workshop

Workshops should prepare ATGS evaluators to apply current and consistent training procedures. The evaluator workshop should be integrated with RT-378.

Target Group

Qualified ATGS.

Workshop Instructor Requirement

Workshop instructors must be a currently qualified ATGS evaluator.

Course Prerequisite

None.

Course Level

Regional, state, or area.

Course Content:

- *Aerial Supervision Mission Evaluation (ATGS/HLCO)*, PMS 505h, https://www.nwcg.gov/publications/pms505
- Mission flights
- Lecture
- STEX
- After Action Review (AAR)
- Interagency and regional consistency
- CRM and human factors including providing constructive criticism
- Training aids

ATGS Final Evaluator

This section describes the qualifications, training, certification, and currency requirements necessary to perform as an ATGS final evaluator.

ATGS Final Evaluator Duties

Provide final ATGS Trainee evaluation and complete the final evaluator verification page in the ATGS PTB.

Position Requirements

- One year of experience as an ATGS evaluator.
- Attend a nationally sponsored ATGS final evaluator workshop. Individuals meeting the requirements of a final evaluator will be designated in writing by their agency. Annual letters will be maintained by the appropriate GACC representative or agency official and disseminated to agency training committees.
- AD employees are not authorized to perform this function.
- Maintain ATGS currency as defined by agency training policy.
- The appropriate RAO or agency program manager will provide a letter of authorization to the ATGS final evaluator upon completion of the requisite training.

Note: State agency aviation program managers can designate state-employed ATGS final evaluators.

Responsibilities

- Coordinate with ATGS instructor and trainee's supervisor to schedule and implement a final evaluation.
- Perform final evaluation and complete the *Aerial Supervision Mission Evaluation (ATGS/HLCO)*, PMS 505h.
- Complete the PTB.
- Complete final evaluator verification or complete the experience section of an evaluation record to document further training recommendations.
- Review evaluation with ATGS trainee.
- Contact trainee's supervisor and review the final evaluation.

ATGS Final Evaluator Workshop

Objective

Prepare ATGS final evaluators to perform ATGS trainee final evaluations. The final evaluator workshop should be integrated with the aerial supervision academy or equivalent.

Target Group

ATGS evaluators

Instructor Requirement

ATGS final evaluator

Course Prerequisite

None

Course Level

National

Course Content

- Policy
- Documentation
- ATGS PTB
- *Aerial Supervision Mission Evaluation (ATGS/HLCO)*, PMS 505h
- CRM and human factors including providing constructive criticism
- Agency specific qualification and certification processes

Leadplane Pilot (LPIL)

The primary mission of the LPIL is to ensure the safe, efficient, and effective use of airtankers in the management of wildland fire.

LPIL operations place a high demand on not only pilot skills, but on a person's ability to manage and coordinate airspace.

A LPIL is an aerial firefighter. As such, National Wildfire Coordinating Group (NWCG) firefighter training titles are used instead of standard Federal Aviation Administration (FAA) pilot terminology. For purposes of LPIL training:

- An “instructor” is herein referred to as an “evaluator.”
- A “pilot examiner or check airman” is herein referred to as a “final evaluator.”
- An interagency LPIL call sign and qualification list is maintained by the national branch chief, pilot standardization (USFS) and published annually in the National Interagency Mobilization Guide.

LPIL Qualifications

Candidates for LPIL designation must be federal or state (or state contract) employees who have the appropriate FAA pilot and medical certifications. USFS candidates shall possess, at a minimum, the flight experience listed in the Forest Service Handbook (FSH) 5709.16. DOI pilots shall meet, at a minimum, the requirements of 351 Departmental Manual (DM) 3. State contract employees shall possess, at a minimum, the flight experience listed in FSH 5709.16. Trainees shall complete the mission training and certification requirements of this section. It is desirable that LPIL candidates have line firefighting experience.

Deviations or Exceptions

The National Aerial Supervision Program Manager, National Branch Chief, pilot standardization in coordination with the appropriate RAO (USFS), the national flight operations manager (DOI, Bureau of Land Management (BLM)), or appropriate state and private forestry aviation official may authorize deviations or exceptions from the training requirements. Approved deviations or exceptions will be in writing. Documentation will be maintained by the appropriate agency official, and a copy will be filed in the trainee's training folder.

LPIL Training

See NWCG LPIL position description.

Note: The courses listed in the NWCG LPIL position description shall be completed prior to entering phase 3 of the National Interagency Leadplane Pilot training course (N9065).

Operational Flight Instruction

Training is divided into three phases. Each phase is to be completed before progressing to the next phase. Identified deficiencies shall be documented and corrected before the candidate's progress to the next phase.

Documentation of Training

The pilot is responsible for maintaining the trainee's training folder. The folder shall include the following:

- Course completion certificates
- Record of ground and flight training including documentation of corrected deficiencies
- Signoffs for each phase of flight training

Flight-Training Records

LPIL evaluators will provide the trainee with written documentation of each training flight. The original copy will be retained by the trainee in their training folder. A copy of the phase training completion form will be sent to the appropriate RAO and a copy will be forwarded to the National Aerial Supervision Program Manager, pilot standardization (USFS), the national flight operations manager (BLM), or the appropriate state and private forestry aviation official. The LPIL evaluator will retain a copy for their records.

LPIL Training and Check Rides

The LPIL Mission Evaluation form is to be used to record all LPIL training and check rides.

Initial LPIL Training Process

Every effort shall be made to limit the number of LPIL evaluators assigned to provide training for each candidate during phases 1 and 2.

Note: The LPIL evaluator may alternate between the left and right (front and back) seats during phases 2 and 3.

Phase 1

- Minimum of two missions of LPIL tactical flight training comprised of low-level flight, mountainous terrain flight, proximity flight, and airtanker simulation.
    - Flight time obtained in the initial LPIL training course can be used to meet this requirement.
- Phase Check –This check will evaluate the following in a non-fire environment:
    - Oral review – The trainee shall pass an oral review covering all activities under phase 1. The oral review will consist of questions involving (1) specific safety-of-flight and key operational issues, (2) discussion questions designed to determine if the trainee has the base knowledge that should be gained from phase 1 activities, and (3) general questions to establish that the trainee has an understanding of the operational issues that are necessary to progress to phase 2.
    - Flight Check – The flight check shall include low-level mountain flying, airspeed control, tactical low-level patterns, and join-ups.

Phase 2

- Minimum of three missions in the right seat observing fire operations with a LPIL evaluator.
- Minimum of two operational periods of observing an ATGS or AITS on missions with a minimum of moderate complexity.
- Ride as an observer on a variety of airtankers during fire missions.
- Minimum of 15 LPIL missions on fires of various sizes and complexity as the flying pilot in the left seat under the supervision of an LPIL evaluator.
- Phase check – An LPIL evaluator will administer the phase check.
    - Oral review– The trainee shall pass an oral review covering all activities under phase 2. The oral will consist of questions involving (1) specific safety-of-flight and key operational issues, (2) discussion questions designed to determine if the trainee has the base knowledge that should be gained from phase 2 activities, and (3) questions designed to determine that the trainee has the knowledge to address situations that can arise when performing the LPIL mission.
    - Flight check – The flight check determines that the trainee (1) can safely perform the LPIL mission, (2) operate within the designated mission profiles, and (3) has been exposed to varying fire size and complexities. Any identified problem areas will be satisfactorily resolved.

Phase 3

All required ground training shall be completed prior to initiating phase 3, including:

- Multiple LPIL missions on fires of varying size and complexity as the flying pilot without reliance on the LPIL Evaluator.
- The number of missions should provide the trainee with an opportunity to demonstrate the skills needed to manage resources safely, effectively, and efficiently as an LPIL.

- A portion of the LPIL missions shall be flown in other geographic areas if not accomplished in phase 2.
- Additional flights in airtankers as necessary.
- Final LPIL progress check – A LPIL evaluator will make a final progress check upon completion of phase 3. This will consist of an oral review covering all aspects of LPIL operations.
- Complete records review – Complete records review of the training folder by the candidate's coach to determine that all requirements have been met and signed off. The coach will then schedule a final check ride.

Final Evaluation and Qualification

To be designated as an LPIL, candidates shall have:

- Satisfactorily completed all operational flight training and acquired the necessary operational flight experience.
- Undergone a complete oral and operational evaluation. The evaluation consists of:
  - A phase 3 sign-off by an LPIL evaluator who has instructed the candidate during phase 3, attesting to the candidate's mission competence.
  - A final flight check by an LPIL final evaluator certifying that the candidate has completed the required training and recommends they be approved to perform as a LPIL. This may require multiple missions to allow the LPIL final evaluator to observe adequate performance in complex environments.

The National Aerial Supervision Program Manager and National Branch Chief, pilot standardization (USFS) in coordination with the appropriate RAO (USFS), the national flight operations manager (BLM), or appropriate state and private forestry aviation official will issue a letter of designation upon successful completion of LPIL training.

LPIL Currency

Experience

LPILs shall complete any combination of 30 LPIL or ATP missions in a three-year period. Pilots not meeting the 30-mission requirement shall pass a flight check on a LPIL fire mission. A mission consists of a flight on an actual fire where retardant is delivered. Each fire flown during a single flight counts as a mission.

Qualified LPILs and Authorization to Observe on Airtanker

Authorization Requirements

- Written authorization from the contracting officer and the leadplane pilot's agency stating they are approved for observation flights. This approval must be presented to the airtanker PIC when asked.
- Notification, before the observation flight, to the national leadplane coordinator, the hosting GACC and airtanker base manager. Verbal notification will suffice.
- Permission from the airtanker PIC and verbal notification from to the company.

Annual LPIL Refresher

Attend RT-9065 annually.

Optional Ground School Refresher Elements

- Target description exercise
- Safety
- Communications
- Tactics
- Airtanker operations
- ICS
- Pre-season updates including airtanker crew assignments, expected fire behavior, and long-term weather forecast
- Fire size-up
- Additional elements may be added based on national trends and needs

Required Flight-Training Refresher Elements

Flight training shall be a minimum of three flight hours and include:

- Target description
- LPIL tactical flight profile
- Communications
- Exit routes
- Emergency procedures
- Pass an annual LPIL mission competency check from an LPIL evaluator

Standardization Evaluation

LPIL mission checks may be conducted at any time for all qualified LPILs without prior notice. The results will be forwarded to the appropriate RAO and National Aerial Supervision Program Manager, National Branch Chief, pilot standardization (USFS), the national flight operations manager (BLM), or appropriate state and private forestry aviation official and the LPIL briefed on the evaluation.

ATP and ASM Training

See the ASM section.

Modular Airborne Fire Fighting System (MAFFS)

MAFFS qualification is an additional required endorsement. LPILs are required to attend the first available MAFFS training session after the initial LPIL qualification.

Requirements to attend are as follows:

- Be a qualified LPIL
- MAFFS LPIL training completed
- Interim certification may be granted upon initial LPIL qualification based on actual MAFFS operational experience obtained during LPIL training. LPILs who obtain interim MAFFS certification shall attend the next MAFFS training session.
- Attend the MAFFS training session every four years.

California Familiarization

LPILs shall receive instruction from an LPIL evaluator in California before operating alone in that area. The National Aerial Supervision Program Manager, National Branch Chief, Pilot Standardization in coordination with the appropriate RAO (USFS), the National Flight Operations Manager (BLM), or appropriate State and Private Forestry Aviation Official may waive this requirement if the LPIL received instruction in this area on fire missions during phase 2 or phase 3 LPIL training.

Supplemental (AD and Contract) LPILs

AD and contract pilots shall maintain the same currency and training requirements stipulated for agency pilots. The USFS Washington Office (WO) will publish a list of supplemental LPILs on an annual basis.

LPIL Coach

This section describes the qualifications, training, and currency requirements necessary to perform as an LPIL coach. The LPIL coach serves as a point of contact and SME for the trainee throughout the training process.

Position Requirements

Qualified LPIL

Responsibilities

- Help develop a training plan for the candidate.
- Coordinate with the appropriate RAO or agency program manager and employee supervisor.
- Ensure training is on track and that all requirements are being scheduled to avoid delaying progress.
- Assist with any problems regarding agency and training requirements.
- Ensure coaches are an independent, nonpartisan person outside the employee's standard chain of command.

LPIL Evaluator

LPIL evaluators provide consistent LPIL instruction, evaluation, and feedback on LPIL missions.

Qualification Requirements

- Possess current LPIL with a minimum of two seasons of experience after initial qualification.
- Possess multi-region experience as a qualified LPIL.
- Possess MAFFS qualification.
- Possess the appropriate FAA flight instructor certificate.
- Possess experience in California.
- Attend the LPIL evaluator workshop every two years.

Responsibilities

- Use applicable methods to promote LPIL trainee progress and certification.
- Use training aids, best practices, forms, and policy documents to maximize the training experience.
- Review and complete applicable phase training documentation.
- Record strengths, areas of improvement, and focus areas using the LPIL Training/Check Form.
- Provide feedback to the trainee's supervisor and coach.
- Share progress reports with the LPIL evaluator community.
- Coordinate with the trainee's supervisor to recommend and schedule the final evaluation flight.

Certification Process

- Pass an LPIL evaluator oral review and flight check.
- The National Aerial Supervision Program Manager, National Branch Chief, Pilot Standardization in coordination with the appropriate RAO (USFS), the National Flight Operations Manager (BLM), or appropriate State and Private Forestry Aviation Official will issue a LPIL evaluator designation letter.

Currency

- Maintain LPIL currency.
- Maintain MAFFS currency.
- Attend an evaluator workshop every two years.

LPIL Evaluator Workshop

Objective

- Prepare LPIL evaluators to apply current and consistent training procedures.
- Target group includes qualified LPILs with 2 years of experience.
- Workshop instructor must be a qualified LPIL evaluator/final evaluator.

Nomination Process

The LPIL supervisors in conjunction with the National Aerial Supervision Program Manager, National Branch Chief, Pilot Standardization (USFS) and the appropriate RAO (USFS), the National Flight Operations Manager (BLM), or State and Private Forestry Aviation Official will nominate pilots who meet the qualifications and whom they consider having the experience, aptitude, dedication, and ability to perform the duties of a LPIL evaluator.

Course Prerequisite

- Possess multi-region experience as a qualified LPIL.
- Possess MAFFS qualification.
- Possess the appropriate FAA flight instructor certificate.
- Possess experience in California

Course Level

National interagency

Course Content

- Instructional methods
- Use of the LPIL Training/Check Form.
- Mission flights
- Lectures
- STEX
- AAR
- Standardization of instruction
- CRM and human factors including how to provide constructive criticism
- Training aids
- Policy

LPIL Final Evaluator

LPIL final evaluator provides final LPIL trainee evaluations. The LPIL final evaluator makes the recommendation for certification to the appropriate agency program manager.

Qualification Requirements

- Current LPIL with a minimum of three seasons as a LPIL evaluator.
- MAFFS qualified.
- Possess the appropriate FAA flight instructor certificates.
- Attend the LPIL final evaluator workshop biennially.

Responsibilities

- Coordinate with LPIL evaluator and trainee's supervisor to schedule and implement a final evaluation and check ride.
- Perform final evaluation/check ride and complete LPIL Training/Check Form.
- Contact trainee's supervisor and review the final evaluation.

Certification

- Pass the LPIL final evaluator oral review and flight check.
- The National Aerial Supervision Program Manager, National Branch Chief, Pilot Standardization in coordination with the appropriate RAO (USFS), the National Flight Operations Manager (BLM), or appropriate State and Private Forestry Aviation Official will issue the LPIL Final Evaluator designation letter.

Currency

- Maintain LPIL currency.
- Maintain MAFFS currency.
- Attend an evaluator workshop every two years.

LPIL Final Evaluator Workshop

Objective

Prepare LPIL final evaluators to apply current and consistent training procedures.

Target Group

Qualified LPIL evaluator pilots with 3 years of experience.

Workshop Instructor Requirement

LPIL Evaluator

Nomination Process

The LPIL working group, in conjunction with the National Aerial Supervision Program Manager, National Branch Chief, Pilot Standardization (USFS) and the appropriate RAO (USFS), the National Flight Operations Manager (BLM), or appropriate State and Private Forestry Aviation Official will nominate pilots who meet the qualifications and whom they consider having the experience, aptitude, dedication, and ability to perform the duties of a LPIL final evaluator.

Course Prerequisites

- Possess multi-region experience as a qualified LPIL evaluator.
- MAFFS qualified.
- Possess the appropriate FAA flight instructor certificate.

Course Level

- National interagency

Course Content

- Final evaluation methods
- Mission flights
- Standardization of final evaluation
- CRM and human factors including how to provide constructive criticism
- Policy

LPIL and Trainee Performance Deficiencies

If an LPIL or trainee is observed performing unsafely or deficiently:

- The event will be discussed with the individual and documented
- Depending on the agency, the documentation will be forwarded to the National Aerial Supervision Program Manager, National Branch Chief, Pilot Standardization, and the appropriate RAO (USFS), the National Flight Operations Manager (BLM), or appropriate State and Private Forestry Aviation Official. The individual may be made unavailable for LPIL and trainee assignments in the appropriate dispatch or status system.

ASM

An ASM is a crew of two specially trained individuals who retain their individual LPIL and ATGS qualifications. Each crew member has specific duties and responsibilities that fall within their area of expertise. These vary in scope based on the mission and task loads of each crew member.

The ATP serves as the PIC and is primarily responsible for fixed-wing aircraft coordination over the incident. Following LPIL qualification, it is recommended that LPILs acquire one year of LPIL experience in multiple geographic regions before operating as an ATP. This does not preclude the LPIL from attending ASM training or flying with an AITS to gain additional firefighting and retardant use experience.

The AITS serves as the mission commander who develops and implements tactics in conjunction with the IC and operations personnel or ATGS. When no IC is present, the AITS assumes those responsibilities until qualified ground personnel arrive. AITS initial candidates must be qualified as an ATGS evaluator. This does not preclude the AITS candidate from attending ASM training.

ASM Use

The ASM is a shared national resource and can be used for LPIL, ATGS, detection and reconnaissance, and all hazard incidents, among others.

ASM Resource Status, Ordering, and Identification

ASM resource identification and status are reported using the following procedures:

Tactical Aircraft Report

The National Interagency Coordination Center (NICC) and GACC report the status of the ASM crews as a national resource. The ATP's LPIL designator is used in conjunction with the agency ASM designator to identify the ASM. The State of Alaska ASM designator is A (Alpha). The USFS ASM designator is B (Bravo). The CAL FIRE ASM designator is C (Charlie). The BLM ASM designator is K (Kilo).

Resource Ordering

Federal ASMs are a national resource and will be ordered in the same manner as LPILs or other national resources. The AITS and LPIL should be rostered as subordinates to the aircraft on the resource order.

Flight and Duty Day Limitations

The AITS, when assigned to an ASM, will have the same flight and duty limitation as the ATP and is considered a crew member. The AITS will match the ATP tour of duty for consistency and resource availability.

Authorized Personnel on ASM_LP Flights

The following positions are authorized to be on board the aircraft during ASM operations:

- ATP and ATP trainee
- LPIL and LPIL trainee, including evaluator/final evaluator
- AITS and AITS trainee, including evaluator/final evaluator

Other passengers must be authorized in writing by the National Aerial Supervision Program Manager, National Branch Chief, Pilot Standardization, National Branch Chief, Aviation Operations (USFS), the National Flight Operations Manager (BLM), or appropriate State and Private Forestry Aviation Official and approved by the flight crew. This is generally limited to three total personnel on board the aircraft during low-level ASM mission operations.

Initial ASM Training (ATP and AITS)

Objective

To establish the qualification and training requirements necessary to perform as an ASM.

Nomination

RAOs and agency program managers will nominate candidates to attend ASM initial training.

Documentation of Training

It is the responsibility of the AITS and ATP candidate to maintain and update a training and experience folder which will include:

- Course completion certificates
- A copy of the signed ATGS certification page
- Annual update of experience to agency-specific Incident Qualification and Certification System (IQCS)
- AITS and ATP letter of authorization

Deviations or Exceptions

The National Aerial Supervision Program Manager, National Branch Chief, Pilot Standardization in coordination with the appropriate RAO (USFS), the National Flight Operations Manager (BLM), or appropriate State and Private Forestry Aviation Official may authorize deviations or exceptions from the training requirements. Approved deviations or exceptions will be in writing. Documentation will be maintained by the appropriate agency official, and a copy will be filed in the trainee's training folder.

ASM Initial and Refresher Course of Instruction

Classroom Training

ASM initial is a national level course.

Required Classroom Elements

- Safety
- Tactical mission CRM
- Communications (tactical)
- Aircraft familiarization and differences
- Tactics
- Airtanker and helicopter sequencing

Optional Classroom Elements

- Crew interaction and CRM utilization
- ICS
- Pre-season update including program updates and changes, expected fire behavior, and long-term weather prediction.
- Additional elements may be added based on national trends and needs.
- Global Positioning System (GPS), radio, and technology review

Operational Mission Instruction

ASM candidates should have a variety of OJT. The following flight-training requirements provide guidance for evaluating ASM candidates. Individualized training and evaluation programs should be developed to refine the skills and abilities of each trainee prior to certification.

AITS Initial Observation Flights

Two observation flights must be completed prior to front seat flight training. One of these flights must occur on a fire mission:

- Two simulated missions must occur during ASM initial.
- Initial OJT must occur under the direct supervision of an AITS evaluator in the same aircraft.

- After initial OJT, and when mutually agreed upon by the ATP evaluator and AITS evaluator, an AITS trainee may be authorized to continue training with an ATP evaluator without an AITS evaluator onboard the aircraft. Approval will be made on a case-by-case basis. A final evaluation must be conducted by an AITS final evaluator onboard the aircraft.

ASM Evaluation

The standard method for evaluating AITS performance is an actual or simulated mission utilizing the ASM mission evaluation form.

Recommended minimum incident complexity for final evaluation:
Crew members' (ATP and AITS) workload will be balanced and at a tempo that limits verbal communication and requires nonverbal communications be utilized for a portion of the mission.

While coordinating a minimum of two airtankers and two helicopters during low-level operations, the ASM will also collaborate with ground resources. The ASM crew will have operational control of the four aircraft, working low-level on the incident. Demonstrate CRM on a moderate complexity incident.

AITS Certification

Upon completion of the PTB, the AITS final evaluator will:

- Administer a final ASM mission evaluation, documenting a rating of (4), for the 14 required evaluation elements.
- Return the completed PTB to the AITS trainee along with recommendations.
- Notify the appropriate agency program manager.
- The AITS trainee is responsible for submitting the completed PTB, training documentation, and a final recommendation to the certifying official.
- The National Aerial Supervision Program Manager or National Branch Chief or the Pilot Standardization in coordination with the appropriate RAO (USFS), the National Flight Operations Manager or the National Aerial Supervision Program Manager (BLM), or appropriate State and Private Forestry Aviation Official issues a letter of authorization to the employee and supervisor.

ATP Certification

The ATP final evaluator will:

- Administer a final ASM mission evaluation, documenting a rating of (4), for the 14 required evaluation elements.
- Notify the appropriate agency program manager.

The ATP trainee is responsible for submitting the training documentation and a final recommendation to a certifying official.

The National Aerial Supervision Program Manager, National Branch Chief, Pilot Standardization in coordination with the appropriate RAO (USFS), BLM National Flight Operations Manager, or appropriate State and Private Forestry Aviation Official issues a letter of authorization to the employee and supervisor.

AITS Supplemental Training

- Attend professional simulator training as a crew.
- Attend agency-provided Pinch Hitter Course (aircraft specific).
- Attend private pilot ground school with private pilot rating.

ASM Currency

- Five (5) ASM missions per year.
- ATP: ASM missions can be considered LPIL missions. LPIL missions do not count toward ATP currency.
- The annual mission summary will be forwarded to the agency program manager.
- If current qualification lapses, a final evaluation must be performed on an actual or simulated mission.
- Attend an ASM refresher every three years.

<u>One Year Lost Currency</u>

If the AITS has not met the five-mission requirement in the previous 12 months, a passing "final evaluation" must be documented by an AITS final evaluator during ASM initial or refresher ***or*** on an actual wildfire assignment.

<u>Two Consecutive Years of Lost Currency</u>

If the AITS has not met the five-mission requirement for the second consecutive year, a passing "final evaluation" must be documented by an AITS final evaluator during ASM initial or refresher, as well as on an actual wildfire assignment.

Quality Assurance (QA)

Agency program managers may request a QA assessment. QA evaluations may occur during the ASM refresher, ASM initial, or during an incident. The request will be made by the program manager to the National Aerial Supervision Training Academy (NASTA) course coordinator to describe intent and needs if it will occur during NASTA. The course coordinator will facilitate flights to ensure the QA request needs are met on a case-by-case basis.

ASM Deficiencies

If an ASM is performing deficiently:

- The event will be discussed with the individual and documented. Documentation will consist of recommendations on how to bring the ASM up to current standards (for example, additional academics, coaching, mentoring, and observations).
- The recommendations will be forwarded to the National Aerial Supervision Program Manager, National Branch Chief, Pilot Standardization, and appropriate RAO (USFS), the National Flight Operations Manager (BLM), or appropriate State and Private Forestry Aviation Official. The crew may be made unavailable for ASM assignments in the appropriate dispatch or status system. This may not make them individually unavailable for LPIL or ATGS assignments.

AITS Coach

An AITS coach serves as a point of contact and SME for the trainee throughout the training process.

Position Requirements

Qualified AITS evaluator

Responsibilities

- Help develop a training plan for the candidate.
- Coordinate with the agency program manager and employee supervisor.
- Ensure training is on track and that all requirements are being met to avoid delaying progress.
- Assist with any problems regarding agency and training requirements.
- Coaches should be an independent nonpartisan person outside the employee's standard chain of command.

AITS Evaluator

An AITS evaluator provides consistent AITS instruction, evaluation, and feedback on AITS missions.

Position Requirements

- Possess AITS qualification
- ADs are authorized for this position providing they meet the position requirements
- Maintain AITS currency
- Attend ASM evaluator workshop
- The RAO and agency program manager will track the AITS evaluator

Responsibilities

- Use applicable methods to promote AITS trainee progress and certification.
- Use training aids, best practices, forms, and policy documents to maximize the training experience.
- Review and complete applicable PTB elements.
- Document strengths, areas for improvement, and focus areas using the ASM mission.

Evaluation Form

- Provide feedback to the trainee's supervisor and coach.
- Share progress reports with the AITS evaluator community.
- Coordinate with the trainee's supervisor to recommend and schedule the final evaluation flight.

ASM Evaluator Workshop

Objective

Prepare AITS and ATP evaluators to apply current and consistent training procedures.

- Target group
  - Qualified AITS or ATP
- Workshop instructor requirement
  - AITS and ATP evaluators/final evaluators.

Nomination Process

The AITS working group, in conjunction with the National Aerial Supervision Program Manager, National Branch Chief, Pilot Standardization and appropriate RAO (USFS), the National Flight Operations Manager (BLM), or appropriate State and Private Forestry Aviation Official will nominate AITSs and ATPs who meet the qualifications and whom they consider having the experience, aptitude, dedication, and ability to perform the duties of an AITS and ATP final evaluator.

Course Prerequisite

Multi-region experience as a qualified AITS or ATP

Course Level

National interagency

Course Content

- Instructional methods
- Use of the *ASM Mission Evaluation Form*, PMS 505k
- Mission flights
- Lecture
- STEX
- AAR
- Standardization of instruction
- CRM and human factors, including how to provide constructive criticism
- Training aids
- Policy

AITS Final Evaluator

AITS final evaluators provide final AITS trainee evaluation and complete the final evaluator verification page in the AITS PTB.

Position Requirements

- One year of experience as an AITS evaluator
- AD employees are not authorized to perform this function
- Maintain current AITS qualification
- Attend ASM final evaluator workshop.
- The National Aerial Supervision Program Manager, National Branch Chief, Pilot Standardization in coordination with the appropriate RAO (USFS), or the National Flight Operations Manager (BLM) or National Aerial Supervision Program Manager (BLM), or appropriate State and Private Forestry Aviation Official will provide a letter of authorization to the AITS final evaluator upon completion of the requisite training.

Responsibilities

- Coordinate with the AITS evaluator and trainee's supervisor to schedule and implement a final evaluation.
- Perform final evaluation and complete the *ASM Mission Evaluation Form*, PMS 505k.
- Complete the PTB.
- Review evaluation with AITS trainee.
- Contact trainee's supervisor and review the final evaluation.

ASM Final Evaluator Workshop

Objective

Prepare AITS and ATP final evaluators to apply current and consistent training procedures.

- Target group
  - Qualified AITS or ATP evaluator.
- Workshop instructor requirement
  - AITS or ATP evaluators/final evaluators.

Nomination Process

The AITS working group, in conjunction with the National Aerial Supervision Program Manager or National Branch Chief, Pilot Standardization in coordination with the appropriate RAO (USFS), the National Flight Operations Manager or National Aerial Supervision Program Manager (BLM), or appropriate State and Private Forestry Aviation Official issues a letter of authorization to the employee and supervisor.

Course Prerequisite

Multi-region experience as a qualified AITS or ATP evaluator

Course Level

National interagency

Course Content

- Instructional methods
- Utilization of the *ASM Mission Evaluation Form*, PMS 505k.
- Mission flights
- Lecture
- STEX
- AAR
- Standardization of instruction
- CRM and human factors, including how to provide constructive criticism
- Training aids
- Policy

ATP Evaluator

An ATP evaluator provides consistent ATP instruction, evaluation, and feedback on ASM missions.

Position Requirements

- Qualified LPIL (E).
- One Year following ATP qualification while maintaining currency.
- Attend ASM evaluator workshop.
- Pass an oral evaluation from an ATP final evaluator.
- Pass a flight evaluation from an ATP final evaluator.
- Maintain current ATP qualification.
- The National Aerial Supervision Program Manager, National Branch Chief, Pilot Standardization in coordination with the appropriate RAO (USFS), the National Flight Operations Manager (BLM), or appropriate State and Private Forestry Aviation Official will provide a letter of authorization to the ATP evaluator upon completion of the requisite training.

Responsibilities

- Use applicable methods to promote ATP trainee progress and certification.
- Use training aids, best practices, forms, and policy documents to maximize the training experience.
- Review and complete applicable PTB elements.
- Review document strengths, areas for improvement, and focus areas utilizing the ASM mission.

Evaluation Form

- Provide feedback to the trainee's supervisor and coach.
- Share progress reports with the ATP evaluator community.
- Coordinate with the trainee's supervisor to recommend and schedule final evaluation flight.

ATP Final Evaluator

ATP final evaluators provide final ATP trainee evaluation.

Position Requirements

- One year of experience as an ATP
- Attend ASM final evaluator workshop
- Pass an oral evaluation from an ATP final evaluator
- Pass a flight evaluation from an ATP final evaluator
- Maintain current ATP qualification
- The National Aerial Supervision Program Manager, National Branch Chief, Pilot Standardization in coordination with the RAO (USFS), the National Flight Operations Manager (BLM), or appropriate State and Private Forestry Aviation Official will provide a letter of authorization to the ATP final evaluator upon completion of the requisite training.

Responsibilities

- Coordinate with the ATP's supervisor to schedule a final evaluation.
- Perform a final evaluation and complete the *ASM Mission Evaluation Form*, PMS 505k.
- Review evaluation with the ATP trainee.
- Contact trainee's supervisor and review the final evaluation.

Helicopter Coordinator (HLCO)

HLCO is used in conjunction with ATGS and ASM or as stand-alone aerial supervisors of helicopters. Large incidents may have more than one HLCO operating at the same time.

HLCO Position Duties

- Coordinate, direct, and evaluate tactical and logistical helicopter operations.
- Provide sole aerial supervision on an incident where only helicopters are assigned, otherwise ATGS is required.
- Collaborate with ground personnel to develop and implement tactical and logistical missions on an incident.
- Communicate current and expected fire and weather conditions.
- Provide candid feedback regarding the effectiveness of aviation operations and overall progress toward meeting incident objectives.

- When possible, fly to fixed-wing bases and interact with ATGS, ASM, and LPIL.
- Work with dispatch, AOBD, IC, and operations staff to coordinate the ordering, assignment, and release of incident aircraft in accordance with the needs of fire management and incident command personnel.
- Attend operational briefing (when possible) at ICP.
- Make recommendations for additional orders to cover mission requirements.
- Establish routes, patterns, checkpoints, and dip sites (among others) to identify hazards. Ensure all are added to the flight hazard maps daily.
- Ensure communications are adequate and, if not, make recommendations to incident personnel as needed.
- When working from a helibase, conduct helicopter pilot briefings covering objectives, assignments, established incident protocols, and identified hazards.
- Establish an ordering process with helibase, dispatch, or both for additional aircraft.
- Establish trigger points for smoke and visibility impacts regarding safe operations.

HLCO Initial Training

- Candidates will meet prerequisite experience requirements and mandatory training requirements listed in the *NWCG Standards for Wildland Fire Position Qualifications,* PMS 310-1, or *Forest Service Fire and Aviation Qualification Guide*.
- Attend and pass S-378, Aerial Supervision or equivalent.

Note: USFS and DOI employees must attend and pass the National Aerial Supervision training course or the California Aerial Supervision course. Completion of PTB and recommendation for certification by a currently qualified HLCO.

HLCO Agency-Approved CRM Training

- Federal and federally sponsored AD employees will complete N9059, Crew Resource Management 7 Skills, (FS) facilitated by an authorized instructor.
- State employees will follow state CRM training requirements.

HLCO Mission Training Requirements

The flight-training program should include a variety of work experience and be of sufficient duration to ensure that the individual can independently function as an HLCO following certification.

- Observing a HLCO evaluator during ongoing incident operations.
- All OJT will be under the direct supervision of an HLCO evaluator in the same aircraft.
- Prior to final certification, candidates must undertake an OJT program under the supervision of an HLCO evaluator that provides a variety of experience in initial and extended attack scenarios.

HLCO Candidate Evaluations

- The candidate shall receive a written evaluation at the completion of all missions from the HLCO evaluator as an integral part of the mission debriefing. Multiple missions in a single day may be combined on one evaluation form.
- The *Aerial Supervision Mission Evaluation (ATGS/HLCO),* PMS 505h, form is the standard performance assessment tool.
- The candidate will retain a copy of the Mission Evaluation to supplement information completed by the HLCO Evaluator in the candidate's PTB.

HLCO Training Opportunities

Agency program managers can assist in the development of candidates by assigning a coach and providing a variety of training opportunities in different geographical areas, fuel types, and incident complexities. Training opportunities may include the following:

- Assignments to work with full-time, dedicated and exclusive-use ATGS at an air attack base
- Assignments to a national or geographic area IMT
- Details or training assignments in other geographic areas to increase the depth of experience.

HLCO Certification Process

Upon completion of the PTB, the agency final evaluator will:

- Perform a final mission evaluation.
- Return the completed PTB to the HLCO trainee along with recommendations.
- Notify the appropriate agency program manager.
- The trainee is responsible for submitting their completed PTB, training documentation, and final recommendation to certifying official.

HLCO Supplemental Training

- Load calculation overview
- Attend RT-378, Air Tactical Group Supervisor Refresher, every three years
- N9095, Crew Resource Management 7 Skills (FS)
- S-271, Helicopter Crew Member
- S-372, Helicopter Manager
- S-371, Helibase Manager

HLCO Currency

All HLCO will meet the requirements stated in PMS 310-1 and forward an Annual Mission Summary[1] to the appropriate agency program manager or RAO.

Additionally:

- Every three years, perform, document, and report a minimum of 15 missions (failure to maintain HLCO mission currency requires a passing evaluation by a final evaluator on an actual or simulated mission).
- Each mission may be documented as a "shift" in the appropriate qualification management system.
- Every three years, attend RT-378, Air Tactical Group Supervisor Refresher, as well as RT9059F, Crew Resource Management 7 Skills Refresher (FS) or agency approved CRM refresher course.
- Recertification – See PMS 310-1 or agency-specific policy.

Quality Assurance

Agency program managers may request a QA assessment. QA assessments may occur during RT-378 or on an incident. The request will be made from the program manager to the GACC representative, and a final evaluator will perform the QA assessment as an evaluation flight while documenting the assessment using the *Aerial Supervision Mission Evaluation (ATGS/HLCO)*, PMS 505h.

Note: USFS qualified HLCOs must meet the *Forest Service Fire and Aviation Qualifications* guide and the PMS 310-1 for ATGS currency. CAL FIRE supports the above currency requirements and manages them internally.

HLCO Evaluator

HLCO evaluators should provide consistent HLCO instruction, evaluation, and feedback on HLCO missions.

Position Requirements

- One year following HLCO qualification while maintaining currency
- Attend a regionally sponsored HLCO evaluator workshop. Documentation shall be forwarded to the appropriate GACC representative or agency official
- ADs are authorized for this position providing they meet the position requirements
- Maintain HLCO currency as defined by agency training policy.
- The agency program manager or appropriate RAO will track the HLCO evaluator. State agency aviation program managers can designate state-employed HLCO evaluators.

[1] Annual Mission Summaries, Individual Mission forms, and Mission Evaluation forms are components of the *Aerial Supervision Logbook*, PMS 509.

Responsibilities

- Use applicable methods to promote HLCO trainee progress and ultimate certification.
- Use training aids, best practices, forms, and policy documents to maximize the training experience.
- Conduct ground training exercises.
- Review and complete applicable PTB elements.
- Document strengths and focus on improvement areas utilizing the *Aerial Supervision Mission Evaluation (ATGS/HLCO)*, PMS 505h.
- Provide feedback to the trainee's supervisor or coach.
- Share progress reports with HLCO trainee's GACC representative.
- Coordinate with the trainee's supervisor to recommend and schedule the final evaluation flight.

HLCO Evaluator Workshop

Workshops should prepare HLCO evaluators to apply current and consistent training procedures. The evaluator workshop should be integrated with RT-378.

Target Group

Qualified HLCO

Workshop Instructor Requirement

HLCO evaluator

Course Prerequisite

None

Course Level

Regional, state, or area

Course Content:

- Use of the *Aerial Supervision Mission Evaluation (ATGS/HLCO)*, PMS 505h
- Mission flights
- Lecture
- STEX
- AAR
- Interagency and regional consistency
- CRM and human factors, including how to provide constructive criticism
- Training aids
- HLCO final evaluator

The next section describes the qualifications, training, certification, and currency requirements necessary to perform as an HLCO final evaluator.

HLCO Final Evaluator Duties

Provide final HLCO trainee evaluation and complete the final evaluator verification page in the HLCO PTB.

Position Requirements

- One year of experience as an HLCO evaluator.
- Attend a nationally sponsored HLCO final evaluator workshop. Individuals meeting the requirements of a final evaluator will be designated in writing by their agency. Annual letters will be maintained by the appropriate GACC representative or agency official and disseminated to agency training committees.
- AD employees are NOT authorized to perform this function.
- Maintain HLCO currency as defined by agency training policy.
- The appropriate RAO or agency program manager will provide a letter of authorization to the HLCO final evaluator upon completion of the requisite training.

Note: State agency aviation program managers can designate state-employed HLCO final evaluators.

Responsibilities

- Coordinate with HLCO instructor and trainee's supervisor to schedule and implement a final evaluation.
- Perform final evaluation and *Aerial Supervision Mission Evaluation (ATGS/HLCO)*, PMS 505h.
- Complete the PTB.
- Complete final evaluator verification or complete an evaluation record (experience block) to document further training recommendations.
- Review evaluation with HLCO trainee.
- Contact trainee's supervisor and review the final evaluation.

HLCO Final Evaluator Workshop

Objective

Prepare HLCO final evaluators to perform HLCO trainee final evaluations. The final evaluator workshop should be integrated with the Aerial Supervision Academy or equivalent.

Target Group

HLCO evaluators

Instructor Requirement

HLCO final evaluator

Course Prerequisite

None

Course Level

National

Course Content

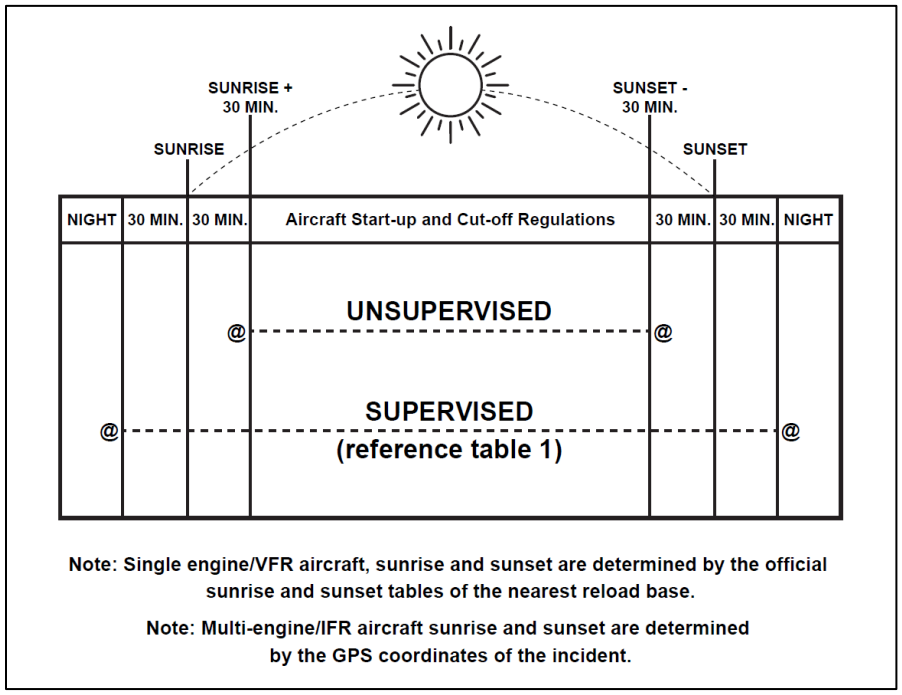
- Policy
- Documentation
- HLCO PTB
- *Aerial Supervision Mission Evaluation (ATGS/HLCO)*, PMS 505h
- CRM and human factors, including how to provide constructive criticism
- Agency-specific qualification and certification processes

Incident aviation operations are often conducted under adverse flight conditions. Congested airspace, reduced visibility, excess aircraft on scene, poor weather, and mountainous terrain all add risk and complexity to incident aerial supervision operations. Complexity dictates the level of supervision required to conduct aerial operations safely and effectively. Aerial supervision may be provided by a LPIL, ASM, ATGS, or HLCO as individual resources or in any combination based on ICS models.

Low Light Conditions (Sunrise and Sunset)

Daylight hours are defined as 30 minutes prior to sunrise through 30 minutes after sunset as noted in the figure below. Low-level fixed-wing operations are permitted 30 minutes before and after sunrise, as well as 30 minutes before and after sunset, but must have concurrence by the involved flight crews and aerial supervision must be on scene (lead, ATCO, ASM, or ATGS). Multi-engine aircraft empty of retardant may fly to assigned bases after daylight hours. Daylight hours may be further limited at the discretion of the pilot, aviation manager, ATGS, ASM, or leadplane because of low visibility conditions caused by smoke, shadows, or other environmental factors.

Figure 3. Aerial supervision organization during initial attack and extended attack



Note: In Alaska, fixed-wing dropping operations shall not be authorized during periods outside of civil twilight.

Note: For paracargo operations, see the *Interagency Smokejumper Operations Guide,* https://www.fs.usda.gov/sites/default/files/media_wysiwyg/interagency_ismog_final_02_05_2018signed.pdf, and the PMS 310-1 for ATGS currency.

Note: Single-Engine Airtankers (SEATs) and helicopters are limited to flight during official daylight hours.

Note: Sunrise and sunset are determined by the official sunrise and sunset tables of the nearest reload base.

Aerial Supervision Requirements

Aerial supervision resources will be dispatched when available to initial or extended-attack incidents to enhance safety, effectiveness, and efficiency of aerial and ground operations. The objective is to minimize the instances of airtankers and helicopters operating in the FTA without aerial supervision.

When aerial supervision resources are co-located with fixed-wing aircraft, they will be dispatched together unless the required aerial supervision is currently on the initial order to maximize safety, effectiveness, and efficiency of scene of the incident operations. or is being dispatched from another location. Examples of appropriate aerial supervision can include ATGS, ASM, and/or leadplane. Federal policy dictates additional requirements as listed below.

Table 1. Incident Aerial Supervision Requirements. Deviations from this table may be authorized by the agencies through local mitigations.

SITUATION	HLCO	ASM / LPIL	ATGS / ASM
Three or more manned aircraft over an incident, or when mixed type and kind of aircraft are over the incident working at the same time	Ordered if no ATGS And only helicopters	Ordered if no ATGS and only fixed wing	Ordered
If manned and unmanned aircraft are operating within the same working area (WA) or area of operation (AO). If only UAS, no aerial supervision is required.	Ordered if no ATGS and only helicopters	Ordered if no ATGS and only fixed wing	Ordered
Fixed-wing low-level operations in low light conditions	NA	Required if no ATGS	Required If no ASM or LPIL
Airtanker not IA Rated/ MAFFS/VLAT	NA	Required	NA
Muti-engine amphibious water scooping aircraft not IA carded	NA	Required if no ATGS	Required if no ASM or LPIL
Level 2 SEAT or single-engine scooper operating on an incident with more than one other tactical aircraft on scene	NA	Required if no ATGS	Required if no ASM or LPIL
Foreign government aircraft	NA	Required if no ATGS	Required if no ASM or LPIL
Congested area flight operations	Ordered	Ordered	Required
Periods of marginal weather, poor visibility, or turbulence	Required if no ATGS, ASM, or LPIL	Required	Required
Active Duty (non-National Guard) military helicopter operations	Ordered	NA	Required if no HLCO
When requested by airtanker, helicopters, ATGS, LPIL, or ASM	Required	Required	Required

**ASM can perform all ATGS missions however, an ATGS is required when requested by ASM.

Required

Aerial supervisory resource(s) shall be over the incident when specified air tactical operations are being conducted. Required aerial supervision resources shall be on scene before dispatching tactical resources (for example, helicopters, airtankers, water scoopers) during periods of marginal weather, poor visibility, or turbulence.

Ordered

Aerial supervisors shall be ordered by the unit maintaining operational control (for example, operations may be continued while the Aerial Supervisor is on the way to the incident, or if the resource is not available and assigned resource is notified).

Assigned

Tactical resource allocated to an incident. The resource may be flying on the way to and from, or on hold at assigned airport or helibase.

NA

Not authorized or applicable to the level of supervision required for the mission or resource.

Note: Aerial supervision personnel and equipment may be used during night flying operations when approved by the agency having operational control. Incidents on USFS lands or using USFS resources will follow the USFS National Night Air Operations Plan, https://gacc.nifc.gov/oncc/docs/2021/Final%202021%20Night%20Air%20Ops%20Plan.pdf.

Aerial supervision personnel must carefully evaluate flight hazards, conditions (for example, visibility, wind, thunder cells, turbulence, and terrain) to ensure that operations can be conducted safely and effectively.

The following policies and guidelines are designed to improve:

Visibility

Visibility must meet the FAA Visual Flight Rules (VFR) minimum requirement for the airspace where operations occur. When poor visibility precludes safe operations, flights will be suspended. It is highly recommended that all incident aircraft always fly with lights on, appropriate to the aircraft and conditions. Regular position reporting is critical in marginal visibility conditions.

Night Air Operations

Reference FIRESCOPE and *USFS Night Air Operations Plan*.

Hazardous Conditions

Moderate to high winds and turbulent conditions affect flight safety, and water or retardant drop effectiveness. Several factors including terrain, fuel type, target location, resources at risk, and crosswinds, among others must be considered. Aerial operations should cease when safety-of-flight is or may be compromised, water or retardant drops become ineffective, or on the pilot's recommendation. Refer to the *Incident Response Pocket Guide* (*IRPG*), PMS 461, https://www.nwcg.gov/publications/pms461: How to Properly Refuse Risk, for more information.

Evaluate thunderstorms and other hazardous weather activities for flight safety. Erratic winds, lightning, hail, and diminished visibility adversely affect aviation operations. Consider delaying operations or reassigning resources to safe operation areas. Suspend flight operations when lightning or other adverse weather conditions are present. Further reading includes Interagency Aviation Accident Prevention Bulletin 13-04, MAFFS operations plan, Federal Aviation Regulations (FAR) Aeronautical Information Manual.

Note: Any aerial supervisor, pilot, or ground resource can halt operations to mitigate risk or hazardous situations.

Foreign Government Aircraft on United States Incidents

Under international cooperative agreements the USFS, BLM, and state agencies may enlist the assistance of Canadian air tactical resources at United States incidents. A Canadian Air Attack Officer flying in a Bird Dog or LPIL will normally be assigned with Canadian airtankers. The State of Alaska also employs a Bird Dog program and manages it internally for the State of Alaska federally approved airtankers. The Canadian airtanker communications system is compatible with USFS and DOI systems. Aerial supervisors assigned to these incidents will adhere to the following policies and guidelines:

Incidents on Federal Lands

- Aerial supervision shall be assigned to the incident as outlined in the incident aerial supervision requirements table in Table 1.
- A federal ATGS, ASM, or LPIL shall supervise Canadian airtankers. In the absence of a LPIL or ASM, the Canadian Air Attack Officer or Bird Dog is authorized to coordinate airtanker drops and function as ATGS, after completing an orientation.

Deviations From This Policy Must Be Specifically Approved by the Appropriate Agency.

- Airtanker reloads – The reload base for Canadian airtankers shall be determined by the originating dispatch.
- Canadian airtanker pilots shall be briefed on standard drop height minimums as they normally drop from lower heights.
- Canadian airtankers and helicopters operating on federal lands will be managed in the same manner as United States resources.

Incidents on Cooperator Lands

When an ATGS, ASM, or LPIL are assigned to a cooperator incident employing Canadian air resources, the incident will be managed as outlined in this chapter.

Authorization to Lead United States Airtankers

Canadian Air Attack Officers, Canadian Bird Dogs, and Alaskan Bird Dogs are not authorized to lead United States airtankers.

Air Attack Pilot Standards

Pilots flying air tactical missions must be agency approved. Airplane pilot qualification cards must be checked prior to air tactical missions.

Air Attack Pilot Approval

Aerial supervision pilots (for ATGS or HLCO) shall be inspected and approved annually by a qualified USFS or Office of Aviation Services (OAS) pilot inspector. Qualification for air tactical missions shall be indicated on the airplane pilot qualification card.

Pilot Orientation and Training

Prior to flying their initial air tactical mission, preferably pre-season, the pilot shall receive a basic orientation or training from a qualified ATGS. As a minimum, the following shall be covered:

- General scope of the mission
- Incident air organization – emphasis on ATGS, ASM, and HLCO roles
- Specific responsibilities of the ATGS
- Fire anatomy
- Specific responsibilities and expectations of the ATGS pilot
- Air resources commonly assigned to, or present on, the type of incident
- Communications hardware, procedures, protocol, and frequency management
- Air space management, FTA, Temporary Flight Restrictions (TFRs), and flight patterns, among others
- Operational safety
- Standard Operating Procedures (SOP)
- Fuel management
- Dispatch readiness, and availability for duty
- Records management

Personal Protective Equipment (PPE) Policy

The following PPE is required for all interagency ATGS operations (ATGS and pilot):

- Leather or Nomex® shoes
- Full-length cotton or Nomex® pants or a flight suit
- Cotton or Nomex® shirt

The following PPE is required for all interagency HLCO operations (HLCO and pilot):

- Leather or Nomex® shoes
- Pants and long sleeve shirt made of Nomex®, or a flight suit
- Leather or Nomex® gloves
- Agency approved flight helmet

LPIL and ASM

Policy

The use of PPE by personnel engaged in LPIL and ASM operations is required per agency policy. This requirement is stated in various publications, including the *USDA Safety and Health Handbook*, FSH 6709.11, Chapter 3; the *DOI Safety and Health Handbook*, 485 DM, Chapter 20; and both departments' *Aircraft Accident Prevention Plans*. Specific requirements for PPE differ slightly among organizations. A complete text of requirements can be found in the DOI Departmental Manual (351 DM 1).

Requirements

Flight Suit

Must be a one-piece fire-resistant polyamide, aramid material, or equal. The use of two-piece wildland firefighter Nomex® shirts and trousers is authorized.

Protective Footgear

Leather boots shall extend above the ankle and may not have synthetic insert panels (such as jungle boots).

Gloves

Must be polyamide, aramid material, or all leather gloves—without synthetic liners. Leather gloves must cover the wrist and allow required finger dexterity.

Flight Helmets

Aerial supervision from helicopters requires a flight helmet.

Oxygen Requirements

Flights must comply with 14 CFR Part 135, 14 CFR§91,211, 14 CFR§135.89, or more restrictive contractual regulations.

Note: Refer to aircraft contract for specific direction on applicable FARs.

Day and Night Flight Policy

Twin-Engine Fixed-Wing

These aircraft are not limited to daylight operations. The aircraft can travel to and from, or work over the incident before sunrise and after sunset if the aircraft and pilot are equipped and authorized for Instrument Flight Rules (IFR) operations. The aircraft must also be in compliance with fixed-wing low-level operations in low light conditions outlined in this guide. Consult agency policy for further clarification.

Single-Engine Fixed-Wing

Flight time is limited to 30 minutes prior to sunrise and 30 minutes after sunset unless the aircraft is IFR-equipped, and the pilot is qualified.

- USFS: Use only multi-engine or turbine-powered single-engine aircraft (fixed-wing or helicopter) for night flights that meet the applicable requirements in FAR Part 91 and Part 61, as referenced in FSH 5709.16 or applicable contract requirements.

Helicopters

Flight time is limited to 30 minutes prior to sunrise and 30 minutes after sunset. Multi-engine helicopters are not limited to daylight operations under certain stipulations, such as emergencies, lighted airports, or specific programs or contracts.

- USFS: Low-level helicopter night flight operations will primarily be conducted using Night Vision Goggles (NVG). A temporary unaided flight is allowed when excessive illumination exists and becomes hazardous to NVG aided flight. Helicopters will be approved for NVG operations. Refer to agency policy, aircraft contract, or both.

Flight Crew Duty Day and Flight Hour Policy

Refer to the *Interagency Standards for Fire and Fire Aviation Operations* (Red Book), Chapter 16, for current interagency interim flight and duty limitations https://www.nifc.gov/policies/pol_ref_redbook.html.

Communications Guidelines

Trainee Communications

At the discretion of the evaluator/final evaluator, ATGS and HLCO trainees are recommended to announce themselves on initial contact with other aircraft, ground resources, and dispatch.

Flight Following

A frequency is assigned by the dispatch center for check-ins and incident related information. National Flight Following (NFF) frequency includes 168.650 Tx/Rx. Tone 110.9 Tx/Rx as the primary flight follow frequency. Local units may assign an additional frequency, for example based on unit policy. This includes Very High Frequency (VHF) Amplitude Modulation (AM) and Frequency Modulation (FM). Dispatch centers may require a 15-minute check-in or a confirmation that an aircraft is showing positive on the automated flight following (AFF) system. See the *National Interagency Standards for Resource Mobilization* and GACC Mobilization Guide for specific flight following responsibilities.

- **Note:** Consult hosting dispatch center for local procedures.

Air-to-Ground Communications

A dedicated air-to-ground frequency shall be continuously monitored by aerial supervision resources.

- IA – Many agencies have pre-assigned FM air-to-ground frequencies assigned to geographic areas. Other agencies use standard work channel frequencies.
- Extended attack incidents – Specific frequencies should be ordered to avoid radio conflicts with other incidents. Some incidents require two air-to-ground frequencies to separate command and tactical air-to-ground communications. These frequencies must be ordered through the dispatch system. Once assigned, incident frequencies and their specified use will be listed in the Air Operations Summary (ICS 220), and the Incident Radio Communications Plan (ICS 205).

Air-to-Air Communications

Communication between all airborne incident aircraft is critical to safety and effectiveness. Air-to-air communications are usually accomplished using a VHF-AM frequency. California uses a VHF-FM for air-to-air communications, requiring three FM radios.

- Primary air-to-air frequencies are assigned on an aircraft dispatch form. Agencies may have pre-assigned air-to-air frequencies for IA and are specific to geographic areas. Specific frequencies should be ordered for extended attack incidents to avoid conflict with other incidents through the local dispatch center. Extended attack incidents have discreet air-to-air frequencies assigned by the incident's Communication Unit Leader and are listed in the Air Operations Summary (ICS-220), and Incident Radio Communication Plan (ICS-205).
- Secondary air-to-air frequencies are assigned on an *NWCG Aircraft Dispatch Form*, PMS 250. If needed due to radio congestion, a second air-to-air frequency should be established for helicopter operations. This frequency may also be used for the flight following frequency at the helibase. The ATGS should retain the primary air-to-air frequency for fixed-wing operations so airtankers on the way to an incident can check-in. A discreet air-to-air frequency may be required for LPIL operations.

Air-to-Air Continuity

The ATGS must monitor all assigned air-to-air frequencies and maintain communications with incident aircraft. Air resources under the direct supervision of the ATGS must monitor their assigned air-to-air frequency.

Air Guard

VHF-FM 168.625 (TX Tone 110.9) has been established as the United States Department of Agriculture (USDA) and DOI emergency frequency. This frequency is permanently programmed and continuously audible in the multi-channel programmable radio system.

Authorized uses of the Air Guard frequency include:

- In-flight aircraft emergencies
- Emergency aircraft-to-aircraft communications
- Emergency communications between air and ground resources

- Dispatch contact (when use of the designated flight following frequency does not result in positive communications)
- Initial call, recall, and redirection (diversion) of aircraft when assigned frequencies fail to work

Air-to-Air Enroute Position Reporting

During periods of poor visibility, a VHF-AM or VHF-FM frequency may be established for assigned aircraft position and altitude reporting (for example, calls in the blind).

In-flight Communications Failure

At time of dispatch, all aircraft must have both VHF-AM and VHF-FM radio systems in working order. In the event of a radio system failure, the following will apply:

- Total System Failure: No ability to monitor or transmit – seek a safe altitude and route and return to base in accordance with FARs.
- VHF-FM System Failure: Report the problem to other aircraft and dispatch (if able) on VHF-AM system and return to base in accordance with FARs.
- VHF-AM System Failure: Report the problem to other aircraft, IC, and dispatch on VHF-FM system and return to base in accordance with FARs.

Frequency Management

- Both VHF-FM and VHF-AM frequencies are allocated to wildland agencies.
- VHF-FM is allocated by the National Telecommunications and Information Administration.
- VHF-AM is allocated by the FAA.
- VHF-AM frequencies may change from year to year.
- Additional FM and AM frequencies may be allocated during major fire emergencies.
- The agency dispatch centers may order additional frequencies through GACCs.

Backcountry and Uncontrolled Airstrips

When there is a potential conflict between agency aircraft and public users of backcountry airstrips, announce intention relating to fire activity on the appropriate backcountry frequency. The Air Attack Pilot should monitor Unicom, Multicom, Common Traffic Advisory Frequency and brief the ATGS regarding traffic.

Conflicting Radio Frequencies

When multiple incidents in relative proximity are sharing the same tactical frequencies, interference can seriously impair operations. The ATGS must recognize this and request different frequencies through dispatch or the IMT Communications Unit Leader. ATGS may select a low transmit power setting, if available, to attempt to mitigate interference issues. A local (geographic area) frequency coordinator and the National Interagency Incident Communications Division should be involved when assigning frequencies where several incidents are in close proximity.

Tone Guards

Tones have been established to allow the use of assigned frequencies selectively. The tone can be programmed, or selected, on VHF-FM radios for both receiving and transmitting frequency positions. When tones are assigned, incident aircraft shall use them as directed. When frequencies are protected in the receive position, only radios that have a specified tone in their "transmit" position will be heard.

Air Resource Identifiers

- ATGS and HLCO identifiers on the way to and from incidents will use their unit identifier (Air Attack or HLCO) or tail number (only last 3) until they assume incident duties.
- The State of Alaska ASM designator is A (Alpha). The USFS designator is B (Bravo). The CAL FIRE ASM designator is C (Charlie). The BLM ASM designator is K (Kilo).
- LPIL identifier is "lead."
    - LPIL – Pilots are assigned a one or two-digit identifier (lead 1 is pronounced "lead one" and lead 0-1 is "lead zero one").
    - Airtanker: Tanker plus identification number (tanker 21 is pronounced "tanker two one").
    - Scooper: Scooper plus identification number (scooper 260 is "scooper two six zero").
    - MAFFS: MAFFS plus identification number (MAFFS 6 is "MAFFS six").
    - Helicopter: Helicopter plus last three characters of N-number (helicopter 72D is "helicopter seven two delta") or a locally assigned agency identifier (helicopter 534 is "helicopter five three four").
    - Smokejumper Aircraft: Jumper plus last two characters of N-number (Jumper 41) or an agency assigned identification number.
    - Other fixed-wing: Other fixed-wing are identified by the make or model prefix plus the last three characters of N-number (Cessna 426).
- Other identifiers:
    - Air ops: Air Operations Director
    - Air support: Air Support Group Supervisor
    - Operations or ops: OSC

Message Sequence

Protocol requires the resource you are calling be stated first, followed by your identification ("Tanker two three, Trinity Air Attack"). Make messages as short and concise as possible.

Frequency Identification

Monitoring several frequencies when all are actively receiving transmissions makes it difficult to determine which frequency is being heard. When making initial contact, state the frequency you are transmitting on ("Lead six-eight, Bear Air Attack on Victor one-one-eight-two-five-zero").

Airspace Policy

The *NWCG Standards for Airspace Coordination*, PMS 520, https://www.nwcg.gov/publications/pms520, covers all aspects of wildland agency airspace management. Aerial supervision personnel must be familiar with information in the guide and FAA designated airspace. Dispatch centers and airtanker base managers should have a copy available for reference. Clearance from dispatch is not a clearance from the FAA or Air Traffic Control (ATC) and the pilot must obtain clearance appropriate to the airspace.

Federally Designated Special Use Airspace (SUA)

Incidents may be located in, or flight routes to incidents may pass through, areas designated by the FAA as SUA. Operations through, or within these areas, may require specific procedures.

SUA per the *FAA Aeronautical Information Manual (AIM)*, "consists of airspace wherein activity must be confined because of its nature and/or wherein limitations may be imposed upon aircraft operations that are not part of those activities." These areas include Military Operations Areas (MOAs), Restricted Areas (RAs), Prohibited Areas (PAs), Alert Areas (AAs), Warning Areas (WAs), and Controlled Firing Areas (CFAs).

SUA Locations

All areas except CFA are identified on National Oceanic and Atmospheric Administration (NOAA) aeronautical sectional charts. Many of these are in wildland areas throughout the United States.

Procedures

The *NWCG Standards for Airspace Coordination,* PMS 520, and the FAA Handbook 7400.2 (Procedures for Handling Airspace Matters) discuss procedures to be used when wildland aerial fire operations are requested in or through these areas. Often, flights through or within SUAs require authorization from the using or controlling agencies. Depending on the type of SUA involved, contact with the controlling agency may be initiated by the air resource pilot. Dispatch is not a controlling agency regarding airspace.

- RA – These areas denote the existence of unusual and often invisible hazards to aircraft such as artillery firing, aerial gunnery, or guided missiles. Aircraft must obtain authorization from the controlling agency prior to entry. Many dispatch centers have a deconfliction plan for this type of airspace.
- MOA – Many MOAs in the western United States are in airspace over agency lands. Current information regarding MOA scheduling is published in the Area Planning (AP/1B) Handbook and Charts. When wildfire occurs in these areas the local unit should contact the controlling agency and notify them that incident aircraft will be in the area. Do not assume there will be no military activity within the SUA. Authorization is not required to enter an MOA; however, the controlling agency may alter operations in the vicinity of the incident.
- Military Training Route (MTR) – MTRs are located over many agency lands in the United States and are referred to as hot routes. Centers should have daily schedule information and may notify the FAA and military.
- Scheduling Activity when incident aircraft may conflict with military aircraft on or near an MTR. Do not assume an MTR has been de-conflicted.

- Other Military Training Routes and Areas – While the MOAs and MTRs are charted on sectional maps and the AP/1B charts, Slow Speed Low-Altitude Training Routes (SRs) and Low-Altitude Tactical Navigation Areas (LATNs) and other low-altitude flights are not charted, and schedules are not published. Dispatch centers should alert you to these flights, if known. The ATGS will notify the dispatch center and other incident aircraft if they observe military aircraft on the way to, near, or within the operational area.

Incident Airspace – FTA

The airspace surrounding an incident is managed by the Aerial Supervisor who must implement FTA procedures. All wildland incidents, regardless of aircraft on scene, have an FTA. If an incident has an active TFR in place, clearance from the controlling aircraft is required prior to TFR entry. See section for TFR, for more information. If aerial supervision is not on scene, the first aircraft on scene will establish the FTA protocol.

The FTA is a communication protocol for firefighting agencies. It does not pertain to non-participating aircraft.

Key components and procedures of the FTA include:

- Initial Communication Ring – A ring 12 nautical miles (nm) from the center point of the incident. At or prior to 12 nm, inbound aircraft contact the ATGS or appropriate aerial resource for permission to proceed to the incident. Briefing information is provided to the inbound aircraft by the Aerial Supervisor regarding the incident.
- No Communication (NoCom) Ring – A ring 7 nm from the center point of the incident that should not be crossed by inbound aircraft without first receiving clearance from the appropriate on-scene incident aircraft.
- Three (3) Cs of initial contact – Communication requirements and related actions to be undertaken by the pilot of the inbound aircraft:
    - Communication – Establish communication with the controlling Aerial Supervisor or an on-scene aircraft if there is no aerial supervision.
    - Clearance – Receive clearance from Aerial Supervisor (or on-scene aircraft if there is no aerial supervision) to proceed to the incident past the NoCom ring. The inbound pilot will acknowledge receipt of clearance or remain outside the NoCom ring until the clearance is received and understood.
    - Comply – Inbound aircraft will comply with clearance. If compliance cannot be accomplished, the inbound aircraft will remain outside the NoCom ring until an amended clearance is received and understood.
- Departing Aircraft – Aircraft departing incident airspace must follow assigned departure route and altitude. Aerial supervisors must deconflict routes for departing aircraft within the airspace.

Initial Points (IP)

The IP is a location where airtankers initially fly to when coming to the fire. It can be identified by latitude and longitude, a geographic location, or even a distance and direction from the fire.

TFR

Under the conditions listed below, the responsible agency should request a TFR under FAR Part 91.137 (a)(2). A TFR may be initiated by the dispatch center, IC, AOBD, LPIL, ASM, or ATGS.

For more information, refer to the *NWCG Standards for Airspace Coordination,* PMS 520, or FAR Part 91.137 (a)(2).

Aerial Supervision Responsibilities Regarding TFRs

During the IA phase of an incident, the Aerial Supervisor may initiate a request for a TFR. The Aerial Supervisor should provide information required on the Interagency Request for TFRs form and radio this information to the responsible dispatch coordination center. On type 1 or 2 incidents, the ATGS—in consultation with the ASM, HLCO, or LPIL— will advise the AOBD when the dimensions of the TFR should be changed. These changes must be forwarded immediately to the dispatch center that will initiate a new order for the FAA. The Aerial Supervisor should coordinate with the incident AOBD or local dispatch office as appropriate to recommend termination of an existing TFR.

Ordering a TFR

The Interagency Airspace Coordination Guide covers this subject in detail. Three pieces of information are required:

- Center point latitude and longitude in Degrees, Decimal Minutes (DDM)
    - Latitude and longitude will be converted to degrees, minutes, and seconds by requesting GACC or dispatch center to meet the FAA standards.
- Vertical dimension in feet Mean Sea Level (MSL)
- Horizontal radius in Nautical Miles (nm) from center point
    - Non-standard and non-circular TFR dimensions require points in DDM format at each corner of the polygon listed clockwise around the perimeter.

TFR Additional Factors to Consider

- Length of operation: Extended operations (greater than 3 hours) are anticipated. Local agency policy for the anticipated length of incident operations may apply.
- Congested airspace involved: Operations are in the vicinity of high-density civil aircraft operation (airports)
- Incident size and complexity
- Potential conflict with non-operational aircraft
- Extended operations on MTRs
- Extended Operations within SUA
- The type and number of aircraft operations occurring within the incident airspace and their aeronautical requirements
- The operating altitudes provide all incident aircraft, including the ATGS and ATGS relief aircraft, a safe operating orbit
- Entry and exit points and routes to bases

- Other aviation operations in the geographic area
- Size, shape, and rate of increase of the incident
- Location of the incident helibases, water sources, and other pertinent landmarks
- Location of airports

TFR Lateral Dimensions

The suggested radius for a TFR is 7 nm from the center point. Any incident helicopter operating bases within "reasonable distance" should be included (for example, helibase or helicopter dipsite) within the TFR. The lateral dimensions and shape may be irregular to conform to incident airspace requirements. TFRs reaching 20 nm will require a special frequency from the FAA.

TFR Vertical Dimensions

The suggested guideline for an incident TFR is 2,000 feet above the highest-flying incident aircraft. Generally, this will be 4,500 feet above terrain.

- **Note:** The vertical and lateral dimensions of the desired airspace may conflict with FAA requirements and what is approved. The FAA, through the dispatch center, will provide the approved TFR dimensions.

TFRs for Multiple Incidents in Close Proximity

Multiple incidents in close proximity may result in overlapping restrictions. To avoid confusion, the respective dispatchers and AOBDs should consolidate multiple TFRs in one manageable TFR. This will need to be negotiated between agencies and IMTs. Frequency management will also need to be considered. If the TFRs do not overlap, they may share boundaries.

Proper Identification of TFR Part 91.137 Paragraph

TFR Part 91.137 is divided into three sections referred to as paragraphs— (a)(1), (a)(2), and (a)(3)— indicating the type of disaster event normally associated with each designation. The most requested TFR for wildfire is 91.137 (a)(2). These disaster events may include:

- Volcanic eruption, toxic gas leaks, spills
- Forest and range fires, earthquakes, and tornado activity, among others. Includes disaster and hazard incidents of limited duration that would attract an unsafe congestion of sightseeing aircraft, such as aircraft accident sites.

Non-participating aircraft may enter the TFR under the following conditions:

- The aircraft is carrying law enforcement officials.
- The aircraft is on a flight plan and carrying properly accredited news representatives.
- The aircraft is operating under the ATC approved IFR flight plan.
- The operation is conducted directly to or from an airport within the area or is necessitated by the impracticability of VFR flight above or around the area due to weather or terrain. Notification is given to the Flight Service Station (FSS) or ATC facility specified in the Notice To Air Missions (NOTAM) for advisories concerning disaster relief aircraft operations. The operation does not hamper or endanger relief activities and is not conducted for observing the disaster.
- Participating aircraft must be approved by the official in charge of the on-scene emergency response and must be directed by the official in charge as guided by 91.137(a)(2).

Protocol for Airspace Conflicts and Intrusions Inside a TFR

When incident airspace conflicts and intrusions occur, the Aerial Supervisor must:

- Immediately ensure the safety of incident aircraft.
- Notify incident aircraft in the immediate area of the position of the intruder.
- Attempt radio contact with intruder aircraft by use of VHF-AM (known Victor, local Unicom) and VHF-FM (assigned, local, or Air Guard) frequencies.
- If radio contact can be established, inform the intruder of the incident in progress, airspace restriction limitations in effect, and other aircraft in the area. Determine if the intruder has legitimate authority to be within the TFR.
- Request intruder departs TFR area (assign an altitude and heading if necessary). Request the intruder to stay in radio contact until clear of the TFR.
- If the aircraft is a legitimate "non-participating" aircraft and has the authority (law enforcement) to be within the area, communicate with the aircraft and advise incident aircraft of its presence. If possible, coordinate altitudes, and locations.
- For drone conflicts and intrusions please reference Unmanned Aircraft Systems: https://www.faa.gov/uas/.
- *NWCG Standards for Airspace Coordination*, PMS 520, https://www.nwcg.gov/publications/pms520.

If radio contact is not established:

- Do not attempt to drive, guide, or force the intruder from the area. The Aerial Supervisor must monitor intruder's position, altitude, and heading.
- The Aerial Supervisor must ensure that incident aircraft are informed and kept clear of intruder. This may require removing incident aircraft and suspending operations for as long as intruder is considered a potential hazard.
- Report intruder immediately to local dispatch office and ask them to contact the Air Route Traffic Control Center (ARTCC). The FAA sometimes has the capability of tracking an aircraft or identifying the aircraft.
- If there is a conflict or intrusion, report it to the appropriate dispatch center. Ask dispatch to report the intrusion to the local ARTCC.
- Submit a Mishap or Aviation Safety Communiqué (SAFECOM) report per agency policy and procedures.

Air Operations in Congested Areas

Fires in the urban interface are in congested areas. Airtankers can drop retardant in congested areas under DOI authority given in FAR Part 137. USFS authority is granted in exemption 392, FAR 91.119 as referenced in FSM 5700 and 5709.16. When such operations are necessary, they may be authorized and are subject to these limitations:

- Airtanker operations in congested areas may be conducted at the request of the city, rural fire department, county, state, or federal fire suppression agency.
- An ASM or LPIL is ordered to coordinate aerial operations.

- The ATC facility responsible for the airspace is notified before or as soon as possible after the beginning of the operation.
- A positive communication link must be established between the LPIL or the ASM, airtanker pilots, and the responsible fire suppression agency official.
- The IC or designee for the responsible agency will advise aerial supervision personnel or airtanker that the line is clear before retardant drops.

Use of Firefighting Aircraft Transponder Code 1255

All incident aircraft will utilize a transponder code of 1255 unless ATC assigns another code.

SUA Reminders

- Check with dispatch when receiving the resource order.
- Is the incident within SUA?
- Is the RA, MOA, or MTR "hot" or about to be?
- Confirm the military has been notified and what action will be taken.
- The pilot must obtain clearance and routing from ATC through or around RAs on the way to the incident.
- Always be alert for military aircraft even when SUA and MTRs are "cold."

Canadian Airtankers on United States Border Fires

On fires near the Canadian and US. border, a Canadian Air Attack Group may be dispatched to a U.S. fire.

- This group may include two airtankers or scoopers and a Bird Dog.
- On board, the Bird Dog is an Air Attack Officer, very similar to an ATGS.
- Typically, on a 'quick strike' across the border, the Bird Dog would assume control of the airspace and work the fire until a U.S. ATGS is present.
- When a U.S. ATGS is on scene, the ATGS has overall responsibility for the airspace.
- The Bird Dog oversees directing Canadian airtanker operations much like a LPIL under the supervision of the ATGS. The ATGS is responsible for the direction of all U.S. resources and the Bird Dog.
- Refer to policies of the local agency or your home agency about the utilization of Canadian air resources.
- The local unit dispatch should coordinate flights with Air and Marine Interdiction Coordination Center at 1-866-AIRBUST.

Chapter 4 – Incident Aircraft

Aerial supervisors should have knowledge of the types of aircraft they supervise, how to communicate with them, and the logistics required to support them.

Tactical and logistical aircraft supervised and coordinated by aerial supervisors may be procured from the USFS, DOI OAS, U.S. Department of Defense, or state, county, or municipal sources. Contract or procurement agreement requirements and standards will vary among the various sources. For more detailed information about air tactical and logistical aircraft, refer to the Aircraft Identification Library on the DOI and USFS Interagency Aviation Training site at: https://www.iat.gov/default.asp.

Note: See the USFS Standards for Airtanker Operations, https://www.fs.usda.gov/managing-land/fire/aviation/publications for specific information related to federal airtankers.

Very Large Airtankers (VLAT)

VLATs may be used on fires to augment Type 1, Type 2, and Type 3 airtankers, but not as a replacement.

- VLAT airtanker base operations will not limit or restrict the capacity of an airtanker base to load large airtankers (LAT).
- Establish flight path holding areas and altitudes, to avoid creating hazards to other aerial resources within the FTA.
- To avoid wake turbulence, it is required to wait a minimum of 3 minutes after the VLAT has dropped to resume aerial operations near the pattern from the drop.
- Aerial supervision (the PMS 310-1 for ATGS currency or ASM) is required by contract and interagency policy for VLATs while dropping retardant.
- The leadplane or ASM must be on scene prior to dispatching the VLAT.
- VLATs are less maneuverable than large airtankers and should be used in less challenging terrain that affords better maneuverability and effectiveness for dispensing.
- The VLAT's minimum drop height is 250 feet above the top of the vegetation. Generally, drop heights should increase when using higher coverage levels.

Note: See the USFS Standards for Airtanker Operations for specific information related to federal airtankers: https://www.fs.usda.gov/sites/default/files/2024-05/FS-Standards-for-Airtanker-Ops.pdf.

Airtanker Typing

Table 2. Airtanker Typing

Ordered As	Type	Capacity (gallons)
VLAT	VLAT	6,000+
LAT	1	3,000-5,999
	2	1,800-2,999
SEAT or Multi-Engine	3	800-1,799
	4	Up to 799

Airtankers Capabilities

Table 3. Airtanker Classification (Does not account for retardant download requirements.)

Type	Aircraft Make and Model	Max. Gallons	Cruise Speed (Knots)	Tank/Door System
VLAT	DC-10	9,400	380	3 Constant Flow Tanks
VLAT	747	18,000	500	1 Pressurized System
Type 1	C-130H/Q	4,000	300	1 Constant Flow
Type 1	B-737	4,000	450	1 Constant Flow
Type 1	C-130 (MAFFS)	3,000	300	1 Pressurized System
Type 1	DC-7	3,000	235	8 Doors
Type 1	BAE-146	3,000	330	5 Valves-Constant Flow
Type 1	RJ-85	3,000	340	1-Constant Flow
Type 1	MD-87	3,000	320	1-Constant Flow
Type 2	Q-400	2,600	320	1-Constant Flow
Type 2	P3	2,250	328	1-Constant Flow
Type 3	CL-215, Scooper	1,400	160	2 (foam capable)
Type 3	CL-415, Scooper	1,600	180	4 (foam capable)
Type 3	S2 Turbine Tracker	1,200	230	1-Constant Flow
Type 3	Air Tractor AT-802 F	800	170	1-Constant Flow
Type 3	Air Tractor AT-802 F (Amphibious)	800	150	1-Constant Flow
Type 4	Air Tractor AT-802/602	600-799	140	1 (in-line or horizontal)
Type 4	Turbine Thrush	400-770	122	1 (in-line or horizontal)
Type 4	Turbine Dromader	500	122	1 (in-line or horizontal)

Airtanker Retardant Delivery Systems

Due to the number of approved airtanker makes and models and the number of airtanker operators, there are several approved tank and door systems. The tank and door systems are evaluated and approved by the IATB and/or contracting agency, to ensure that the systems meet desired coverage level and drop characteristics. The four basic systems used today include the following:

- Variable Tank Door System – Multiple tanks or compartments controlled by an electronic intervalometer control mechanism to open doors singly, simultaneously, or in an interval sequence. The pilot may select a low flow rate or a high flow rate.
- Constant Rate System – A single compartment with two doors controlled by a computer. The system is capable of single or multiple even flow drops at designated coverage levels from 0.5 gallons per 100 square feet (GPC) to + 8 GPC.
- Pressurized Tank System – MAFFS C-130s are equipped with a pressurized system to discharge their 3,000 gallons of retardant through one (18 inch) dispensing nozzle. The system is capable of coverage level (CL) 1, 2, 3, 4, 5, 6, and 8. The line width is about 70 percent of other (LAT) systems but is continuous throughout the drop. The MAFFS pattern is the same as an S2T, constant flow, and setting or coverage at level 8.
- Standard Tank System – This system is common on SEATs with single or multiple tanks and compartments controlled manually or electronically. Some tank systems may be controlled by an electronic intervalometer control mechanism to open doors singly, simultaneously, or in an interval sequence.

Use of Non-Federally Approved Airtankers

A non-federally approved airtanker is an aircraft that is on contract with a cooperator and may not meet USFS or DOI contract standards or policy and may not meet the National Association of State Foresters cooperator aviation standards.

For further information refer to the *Interagency Standards for Fire and Aviation Management* (Red Book), Chapter 16: https://www.nifc.gov/policies/pol_ref_redbook.html.

Non-federally approved airtankers are permitted to reload out of federal airtanker bases, following the standards established in the *NWCG Standards for Airtanker Base Operations,* PMS 508*,* https://www.nwcg.gov/publications/pms508.

Helicopters

ICS categorizes three types of helicopters based on minimum gallons of water or retardant, lift capability, number of passenger seats, and weight capacity. Operations personnel refer to helicopters by type. Density altitude will greatly affect lift capability.

Loads under high-density altitude conditions are displayed in the helicopter classification table.

- Helicopter Type 1
- Helicopter Type 2
- Helicopter Type 3

Table 4. Helicopter Classification

Helicopter Type	Aircraft	Typical Payload at 8,000 feet Density Altitude (lbs.)	Typical Payload at 11,000 feet Density Altitude (lbs.)
Type 1	Sikorsky S-64E (Aircrane)	12,700	9,117
Type 1	Sikorsky S-64F (Aircrane)	15,640	10,288
Type 1	Boeing 234/CH-47 (Chinook)	19,063	15,363
Type 1	Boeing 107/CH-46 (Vertol)	4,656	3,424
Type 1	Sikorsky S-61	4,038	2,221
Type 1	Airbus 332L (Super Puma)	4,328	2,729
Type 1	Airbus SA 330 (Puma)	4,525	3,325
Type 1	Kaman 1200 (Kmax)	5,288	4,588
Type 1	Sikorsky CH-54 (Skycrane)	11,098	7,978
Type 1	Sikorsky UH-60/S-70	6,569	5,669
Type 2	Bell B-214	3,754	2,665
Type 2	Bell B-212	1,973	1,010
Type 2	Bell B-205A-1	1,294	642
Type 2	Bell B-205A-1+	1,596	896
Type 2	Bell B-205A-1++ (Super 205)	2,806	2,120
Type 2	Bell B-412	1,742	884
Type 2	Sikorsky S-58T	1,635	597
Type 3	Bell B-206 B3 (Jet Ranger)	715	380
Type 3	Bell B-206 L3 (Long Ranger)	950	830
Type 3	Bell B-206 L4 (Long Ranger)	1,196	767
Type 3	Bell B-407	1,315	880
Type 3	Airbus 350-B2 (Astar)	1,083	700
Type 3	Airbus 350-B3/H125 (Astar)	1,972	1,911
Type 3	MD Helicopters MD500 D/E/F	515	295

Helicopter Retardant and Suppressant Delivery Systems

There are two basic delivery systems: bucket and tank systems.

- Buckets – Two types of helicopter buckets are used and may or may not have power fill capabilities. These include:
  - Rigid Shell (100 to 3,000 gallons)
  - Collapsible (94 to 2000 gallons)
- Tanks – Internal and external tank systems have been developed for various Type 1 through 3 helicopters. These include:
  - Computerized metered or constant flow tank system
  - Conventional tank and door system

Aerial Supervision Aircraft Considerations

All aircraft must be carded by the appropriate agency official for the mission.

In selecting an aircraft for a particular mission, the following should be considered:

Visibility

Fixed-Wing

- High or low-wing aircraft designed with the cockpit forward of the wings typically provide the best visibility.
- Low-wing aircraft designed with the cockpit over the wings provide for limited visibility.
- Helicopter open cockpit designs facilitate excellent visibility. Consider potential issues derived when in flight without doors. They can fly under smoke layers which fixed wing may not be able to. Helicopters are advantageous if the incident is not near any airport and if the Aerial Supervisor must meet with the OSC. Helicopters are generally utilized for HLCO; however, they may also be desirable for ATGS missions when visibility is limited, or helicopters are meeting incident objectives.

Speed

For large, IA, and multiple incident scenarios, aircraft speed is important. On IA incidents, it is key that the Aerial Supervisor arrives before other aerial resources to determine incident objectives and set up the airspace. Twin-engine fixed-wing aircraft are usually the best choice in these situations (cruise speed of 150 knots [kts] or more, with 200 kts or more being desirable).

- Twin-Engine Fixed-Wing – fast (generally greater than 150 kts)
- Single-Engine Fixed-Wing – slower (generally less than 150 kts)
- Helicopters – slowest (generally less than 130 kts)

Pressurization

When performing missions above 10,000 feet (ft) MSL, consider a pressurized aircraft.

Endurance

Consider length of the mission, distance of dispatch, and area of availability.

Aircraft Performance

Consider operating environment, payload, endurance, runway length requirements, weather, and training needs.

Noise Level

Excessive noise can interfere with the ability to communicate for prolonged periods and can contribute to fatigue. Consider using an active noise-canceling headset to help mitigate noise-related fatigue.

<u>Aircraft Approvals</u>

Aircraft must have interagency approval to be used for an air tactical mission. The approval card must be carried onboard the aircraft.

<u>Avionics Equipment</u>

In addition to the above avionics' requirements, the following are required:

- Headset(s) with boom microphones for each person
- Voice Activated Intercom

- Separate Audio Panels for the pilot and ATGS or AITS
- Separate volume and squelch controls for the pilot and ATGS or AITS
- A separate audio panel and voice activated intercom station in a rear seat may be required in the aircraft to accommodate an ATGS or AITS trainee (observer) of ATGS evaluator or ATGS final evaluator.

Traffic Collision Avoidance System (TCAS and TCAD)

The threat of midair collision is ever-present in the fire environment. TCAS and TCAD are now part of the standard equipment in leadplane and ASM aircraft. The systems are enhanced with special features designed to improve safety and operational effectiveness on incidents. USFS smokejumper airplanes are equipped with TCAS.

Helicopter Emergency Services: Short-Haul and Hoist Extraction

The interagency community produces a hoist and extraction guide annually. Please refer to the following document: *Interagency Emergency Helicopter Extraction Source List*, PMS 512, https://www.nwcg.gov/publications/pms512.

Smokejumper Aircraft

Smokejumper aircraft are turbine-powered aircraft carrying 8 to 12 smokejumpers plus spotters and flight crew. Smokejumpers are primarily used for IA but are also used to reinforce large fires, and build helispots, among other tasks.

MAFFS

See more information at: https://www.fs.usda.gov/managing-land/fire/planes/maffs.

Policy

The NICC mobilizes MAFFS as surge capability when contract airtankers are not readily available within the contiguous 48 states. MAFFS may be made available to assist foreign governments when requested through the State Department or other diplomatic memorandums of understanding.

The Governors of California, Nevada, and Wyoming may activate MAFFS units for missions within state boundaries under their respective memorandums of understanding with military authorities and the Forest Service. With approval from the Forest Service Assistant Director, fire operations is responsible for initiating a MAFFS mission. Refer to the *National Mobilization Guide*, Chapter 20 for additional MAFFS mobilization information.

Through the Memorandum of Understanding, the USFS will provide the following resources:

- MAFFS unit “slip-in tank” systems
- Qualified MAFFS LPIL
- MAFFS Liaison Officer (MLO)
- MAFFS Airtanker Base Manager (MABM)
- VHF-FM radios

MAFFS Home Base (Wing) Locations

Air National Guard and Air Force Reserve units using C-130 are based at the following locations:

- Reno, Nevada (152nd AW) – Air National Guard
- Port Hueneme, California (146th AW) – Air National Guard
- Cheyenne, Wyoming (153rd AW) – Air National Guard
- Colorado Springs, Colorado (302nd AW) – Air Force Reserve

Training and Proficiency

Training will be conducted by the Forest Service National MAFFS Training Coordinator annually for military and agency personnel. Specific training dates will be negotiated with the military airlift wings.

MAFFS Flight Crews

Training of MAFFS crews will be in accordance with military qualifications and continuation training requirements. To become qualified to fly MAFFS operations, MAFFS flight crews must attend initial and recurrent training as appropriate at the annual MAFFS training session. The Air Force Mission Commander (AFMC) will certify to the Forest Service National MAFFS Training Coordinator. The status of flight crew members after the annual training currency requirements are as follows:

- MAFFS airdrop currency is required annually. If more than 120 days have elapsed since the last airdrop, the crew's first airdrop will be restricted to a target judged by the MAFFS LPIL to offer the fewest hazards.
- If more than eight months have elapsed since the last MAFFS airdrop, an airborne MAFFS LPIL supervised waterdrop will be required before entering the incident area.

Currency training will be conducted annually.

MAFFS Operations Policies

MAFFS Aircraft Identification

Each MAFFS aircraft will be identified by a large, high visibility number on the aircraft tail, side of the fuselage aft of the cockpit area, and on top of the fuselage cabin. The MAFFS call sign will be this number (for example, MAFFS 2).

Supervision of a MAFFS Mission

- No MAFFS mission will be flown unless under the supervision of a qualified MAFFS LPIL. The LPIL will communicate with the MLO and AFMC daily on flight needs of military crews.
    - International MAFFS missions will utilize a qualified MAFFS LPIL in the MAFFS aircraft to assist the aircraft commander with tactical requirements. Headquarters (HQ) Military Airlift Command approval must be obtained prior to flying civilian personnel aboard MAFFS aircraft.
    - LPIL operations will be provided on each run, and the runs are restricted to one MAFFS aircraft at a time with no daisy-chain operations of multiple aircraft in trail.

MAFFS

Agencies must participate every 4 years to be re-qualified for operations with MAFFS. Qualified MAFFS will be listed in the *National Interagency Standards for Resource Mobilization.*

Military Flight Duty Limitations

Flight time will not exceed a total of 8 hours per day.

- A normal duty day may be limited to 12 hours.
- Within any 24-hour period, pilots shall have a minimum of 12 consecutive hours off-duty immediately prior to the beginning of any duty day.
- Duty includes flight time, ground duty of any kind, and standby, or alert status at any location.

Standard Operation Procedures (SOPs)

Procedures for working MAFFS on an incident are the same as for contract airtankers. MAFFS flight crews are rotated regularly. The AFMC will verify the status of the flight crews with the MLO. LPILs should be aware that newly rotated flight crews may have restrictions on their initial airdrops to accomplish currency requirements.

Operational Considerations

The procedures for using MAFFS over an incident are much the same as those used for contract airtankers. The ATGS should be aware of the following key differences when using MAFFS aircraft:

- Volume – C-130s configured with MAFFS 2 (M2) normally carry 3,000 gallons unless takeoff performance requires a download
- Load Portions – Capable of start and stop drops
- Coverage Levels – M2 is capable of Coverage Levels 1, 2, 3, 4, 6, and 8
- Retardant Line Width – M2 has a narrower but more uniform line pattern than commercial airtankers. This is a characteristic of the nozzle on the pressurized system. Density (coverage level) at the center meets IATB criteria and remains consistent along the path of delivery.
- Reload – M2 can be sent to reload at pre-approved bases identified in the *NWCG Airtanker Base Directory,* PMS 507, https://www.nwcg.gov/publications/pms507. Normally, following the final airdrop MAFFS aircraft will recover to the activation base for servicing by military personnel.

Communications Considerations

Aircraft Identifier

The number displayed on the aircraft fuselage will identify MAFFS aircraft.

Radio Hardware

MAFFS aircraft are equipped with one USFS supplied P-25 compliant VHF-FM radio operating over the frequency band of 138 to 174 megahertz (MHz). Communications may also be conducted using a VHF-AM frequency in the 118 to 136.975 MHz bandwidth in the same manner as other contract air tactical resources.

Check-in Procedure

The Aerial Supervisor must identify the location and altitude of all other aircraft operating over the incident as well as the incident altimeter setting to all MAFFS aircraft checking in on the way to the incident.

Dispatch Communications

The ATGS or LPIL will notify dispatch whether additional loads of retardant will be required to meet operational objectives on the incident.

Military Helicopter Operations

Regular Military refers to active military, reserve units, and federalized National Guard aviation assets. For an in-depth discussion of military helicopter operations, refer to Chapter 70 of the *Military Use Handbook,* https://www.nifc.gov/nicc/logistics/references.htm. Key portions of the parent text are included below.

Policy

Regular military helicopter assets may be provided by the Department of Defense Support of Civilian Authority as requested by appropriate ordering entities when civilian aviation resources are depleted.

Mission Profiles

Mission profiles for regular military helicopter units are normally limited to:

- Reconnaissance or command and control activities
- Medevac
- Crew transportation
- Cargo transportation (internal and external loads)
- Crew and cargo staging from airports to base camps for incident support

Bucket Operations

An ATGS, ASM, and HLCO shall be utilized whenever military helicopters are sequenced with contracted helicopter resources.

Communications

- Military Radio Hardware – Regular military aircraft are equipped with VHF-AM aeronautical radios that operate in the 118 to 136.975 MHz bandwidth.
- Agency Provided Radio Hardware – VHF-FM aeronautical transceivers compatible with agency frequencies may be provided by the agency.

Note: Until agency-furnished VHF-FM radio systems can be installed, an HLCO is required. Multi-ship operations may be conducted without a HLCO if at least one helicopter has communications capability using civilian bandwidths for air-to-air and air-to-ground communications.

National Guard Helicopter Operations

Policy

The use of National Guard helicopters for federal firefighting purposes within their state boundaries is addressed in applicable regional, state, or local agreements, or in memorandums of understanding between federal agencies and specific National Guard units. The Aerial Supervisor should coordinate with local agency officials, agency aviation management specialists, or the AOBD to ensure planned use of National Guard assets comply with applicable policy and procedures specific to the local area and participating jurisdictions.

Mobilization Authority

The governor can mobilize National Guard aviation assets at the request of local or state jurisdictions for incidents on private land or multi-jurisdictional incidents.

Mission Profiles

In addition to the mission profiles discussed for regular military helicopters above, National Guard helicopters routinely engage in water bucket operations in many states.

Communications and HLCO

Lack of VHF-FM communications capability may be a problem and will need to be addressed prior to use of National Guard aviation resources on federal or multi-jurisdictional incidents. A HLCO should be ordered to mitigate communications issues with ground and aviation resources on an incident.

Training and Proficiency Assessment

Operational procedures, mission training, and proficiency vary between states, National Guard units, and flight crews. The ATGS should assess the proficiency of the resource and adjust as appropriate to provide for the safe and effective use of National Guard resources.

Water Scooping Aircraft

Canadair CL-215, 415, and AT-802 (single-engine scooper).

Policy and Availability

- United States – Water scooping aircraft are located or utilized throughout the U.S. and operate on a basis where water sources are conducive to operations. These aircraft are contracted by DOI, USFS, and state agencies.

USFS: USFS contracted water scoopers shall not be loaded with chemical retardant, water enhancers, or foam per the contract.

- Canada – Water scooping aircraft are widely used in Canada, especially from Quebec west to Alberta. States bordering Canada may have agreements such as the Great Lakes Compact that outline procedures for sharing resources on fires within a specified distance from the border. There may also be provisions for extended use of Canadian airtankers in the U.S. when needed and if available. Aerial supervisors should obtain a briefing on these agreements or procedures when assigned, if applicable.

Night Aerial Supervision

A technology-enhanced exclusive use fixed-wing aerial supervision platform may be available and stationed in R5 USFS Southern California Operations Center (SOPS). The standard hours of the aircraft availability will be 1800 to 0600 however, it can vary throughout the fire season to maximize coverage. The night aerial supervisory platform is ordered through the south operations GACC.

Considerations:

- ATGS will be trained to the standards within the USFS National Night Air Operations Plan and ATGS will be familiar with FIRESCOPE Night Flying Guidelines.
- IA resources may be used on large fires with concurrence from SOPS GACC.
- 14-hour duty day, 8-hour flight time within the previous 24 hours.
- 10 hours of rest between shifts.
- If planned to be used for extended attack or an emerging incident, effort should be made to allow the ATGS to observe operations during daylight hours.
- Only aerial supervisors that are trained and designated can supervise incident aircraft during night operations.

Firewatch Aerial Supervision Platforms

The USFS Firewatch Helicopter is a Bell 209 converted for use as an aerial supervision and intelligence-gathering platform. There are two platforms in use, H-507 and H-509. The platforms are Technology-Enhanced Initial and Extended Attack HLCO/ATGS platforms based in Redding, California, and repositioned as needed.

Call Signs

For mission clarification:

- When in the ATGS profile, the call sign is: Air Attack 507, 509.
- For intelligence gathering, mapping, or suppression resource support profile, the call sign is: Firewatch 507, 509.
- Mission Profiles – The USFS firewatch helicopter will request entry into the FTA in one of the following mission profiles:

  Tactical

  - ATGS
  - HLCO

  Intelligence

  - Tactical intelligence
  - Live video downlink
  - Infrared imagery or video
  - Mapping

Considerations

Clearance for the Firewatch Platform (AA 507 or 509) into the FTA as an ATGS or HLCO should be the same as any relief or IA ATGS or HLCO, one thousand feet either above or below the on-scene aerial supervision or controlling platform for initial briefing and transition of control.

When performing live down link operations, aircraft may request 3,000 to 5,000 Above Ground Level (AGL) altitudes for better big-picture video feed.

Unmanned Aircraft Systems

See *NWCG Standards for Fire Unmanned Aircraft Systems Operations*, PMS 515, https://www.nwcg.gov/publications/pms515.

Unmanned aircraft systems pilots are held to the same pilot operating procedures found in this document (*SAS,* PMS 505). For more information go to https://www.faa.gov/uas/.

Chapter 5 – Wildland Fire Chemicals

Wildland fire suppressants and retardants are chemical agents that are applied to burning and adjacent fuels. Only chemicals that are on the Qualified Products List (QPL) shall be used, and only for the delivery method approved. See the Forest Service's Wildland Fire Chemicals Systems (WFCS) website for details: https://www.fs.usda.gov/rm/fire/wfcs/.

Refer to the *Interagency Standards for Fire and Fire Aviation Operations,* https://www.nifc.gov/standards/guides/red-book, or the WFCS website for the most current information on fire chemicals and their use.

Definitions

Suppressants (Direct Attack)

Suppressants are a fire suppression chemical applied directly to the flame base to extinguish the flame (water, foam, gel, or water enhancer).

Note: Federal land management agencies are not approving the use of fire chemicals (water enhancers) mixed with onboard fire chemical injection systems on federal lands or federally contracted aircraft.

Foam Fire Suppressants

Foam fire suppressants contain foaming and wetting agents. The foaming agents and percentage of concentrate added to water affect the accuracy of an aerial drop, how fast the water drains from the foam, and how well the product clings to the fuel surfaces. The wetting agents increase the ability of the drained water to penetrate fuels. These products are dependent on the water they contain to suppress the fire. Once the water they contain has evaporated, they are no longer effective. Engines, portable pumps, helicopters, and SEATs may apply foam. Some agencies also allow the application of foam from fixed-wing water scoopers.

Water Enhancers

Water enhancers contain ingredients designed to alter the physical characteristics of water to increase viscosity, accuracy of the drop, or adhesion to fuels. They improve the ability of water to cling to vertical and smooth surfaces. The consistency of these products can change depending on the quality of the water used for mixing. Once the water they contain has evaporated, they are no longer effective. Approved products are available for use in helicopter buckets, with some approved at specific mixing ratios for use in SEATs and fixed-tank helicopters.

Long-Term Retardant (Indirect and Direct Attack)

Retardants contain fertilizer salts that change the way fuels burn. They are effective even after the water has evaporated. Large airtankers, SEATs, helicopter buckets, and ground engines may apply retardant. Some retardant products are approved for fixed-tank helicopters. See the QPL for specific uses for each product.

- Recommended coverage levels and guidelines for use can be found in the *IRPG*, under Principles for Airtanker and Water Scooper Use.
- Retardant mixing, blending, testing, and sampling requirements can be found at the USFS WFCS website: https://www.fs.usda.gov/rm/fire/wfcs.

- In general, one can expect chemicals to remain effective for the following amounts of time:
  - Long-term retardants – days to weeks (or until removed by environmental elements such as rain or wind)
  - Foams – minutes
  - Water enhancers and gels – minutes up to possibly an hour or more (direct sunlight breaks down gels faster). Time will vary according to weather conditions (heat, humidity, and wind, among others).

Note: Refreshing dried water enhancers with waterdrops do not provide any additional effectiveness than the water being dropped.

Approved Fire Chemicals

Many different retardants, foams, and water enhancers are approved for use. Prior to approval, these agents must meet rigid criteria to ensure that they are environmentally safe, effective as a retardant or suppressant, and that the chemicals do not harm aircraft surfaces. Chemical concentrates may be dry powder or liquid. All USDA and DOI bases must use chemicals that are either fully approved or conditionally approved during field evaluations. Approved fire chemicals can be found on the QPL found on the WFCS website: https://www.fs.usda.gov/rm/fire/wfcs.

Retardant Mixing Facilities

Retardant may be available from a variety of facilities including fire incident locations. Temporary mixing facilities may be ordered through the incident management system.

Airtanker Base Information

Information regarding the operation and management of airtanker bases can be found in the following documents:

- *NWCG Standards for Airtanker Base Operations*, PMS 508: This guide defines and standardizes interagency operating procedures at all airtanker bases for contractor and government employees.
- *NWCG Airtanker Base Directory,* PMS 507: The directory is intended to aid wildland fire managers, pilots, and contractors who operate at airtanker bases.
- WFCS website: https://www.fs.usda.gov/rm/fire/wfcs.

Waterway and Avoidance Area Policy

This policy has been adapted from the 2016 Implementation Guide for Aerial Application of Fire Retardant. It has been expanded to include additional avoidance areas (both aquatic and terrestrial) for aerial delivery of fire chemicals, as designated by individual agencies, and includes additional USFS reporting requirements.

Note: This policy does not require the helicopter or airtanker PIC to fly in such a way as to endanger their aircraft, other aircraft, or structures, or compromise ground personnel safety.

Table 5. Aerial and Ground Delivery Policy

Aerial Delivery Policy	Ground Delivery Policy
Avoid aerial application of all wildland fire chemicals within 300 feet of waterways. Additional mapped avoidance areas may be designated by the individual agency. For USFS, whenever practical, as determined by the fire IC, use water or other less toxic wildland fire chemical suppressants for direct attack or less toxic approved fire retardants in areas occupied by threatened, endangered, proposed, candidate, or sensitive species (TEPCS) or their designated critical habitats.	Avoid application of all wildland fire chemicals into waterways or mapped avoidance areas.

Definition of Waterway

A waterway is any body of water (including lakes, rivers, streams, and ponds) regardless of whether it contains aquatic life.

Definition of Waterway Buffer

300-foot distance on either side of a waterway constitutes a waterway buffer.

Definition of Additional Mapped Avoidance Areas

This designation includes other areas requiring additional protection outside of the 300-foot waterway buffer. For USFS, this may include certain dry intermittent or ephemeral streams for resource protection, or terrestrial critical habitats.

Guidance for Pilots

Pilots will avoid all waterways and additional mapped avoidance areas designated by individual agencies. To meet the 300-foot waterway buffer zone or additional mapped avoidance areas guideline, implement the following:

When approaching a waterway or riparian vegetation visible to the pilot, to assist in identification of waterways or other avoidance areas, the pilot shall terminate application of wildland fire chemical approximately 300 feet before reaching the area. When flying over a waterway, the pilot shall not begin application of wildland fire chemical until 300 feet after crossing the far bank or shore. The pilot shall adjust for airspeed and ambient conditions such as wind to avoid the application of wildland fire chemicals within the 300-foot buffer zone.

Additional guidance to pilots and aerial supervisors of any aircraft supporting a fire on USFS lands:

- USFS may have additional mapped avoidance areas for TEPCS species, waterway buffers exceeding 300 feet, or certain intermittent or ephemeral waterways identified as avoidance areas for resource protection.
- Aerial supervision resources should inquire if these avoidance areas exist on any USFS fire where they are providing support.

- Prior to fire retardant application, aerial supervisors should be briefed by dispatch on the locations of all TEPCS or other avoidance areas in the vicinity.
- If operationally feasible, pilots should make a dry run over the intended application area to identify avoidance areas and waterways in the vicinity of the wildland fire.

Exceptions for USFS

Deviations from the policy are allowed only for the protection of life or safety of the public as well as firefighters.

Exceptions for All Other Agencies

- When alternative line construction tactics are not available due to terrain constraints, congested area, life, and property concerns, or lack of ground personnel, it is acceptable to anchor the wildland fire chemical application to the waterway. When anchoring a wildland fire chemical line to a waterway, use the most accurate method of delivery to minimize placement of wildland fire chemicals in the waterway (for example, a helicopter rather than a heavy airtanker).
- Deviations from the policy are acceptable when life or property is threatened, and the use of wildland fire chemicals can be reasonably expected to alleviate the threat.
- When potential damage to natural resources outweighs possible loss of aquatic life, the unit administrator may approve a deviation from these guidelines.

Reporting Requirements of Aerially Delivered Wildland Fire Chemicals into Waterways, Waterway Buffer Areas, and Mapped Avoidance Areas

- During training or briefings, inform field personnel of:
  - Environmental guidelines for fire chemical application requirements for avoiding contact with waterways
  - Additional mapped avoidance areas as designated by individual agency; and
  - Their responsibility for upward reporting in the event of application, for whatever reason, into avoidance areas.

If application of wildland fire chemicals occurs or anyone believes chemicals may have been introduced within a waterway, waterway buffered areas, or other mapped avoidance areas, the following is required as appropriate:

- Inform supervisor
- The information will be forwarded to incident management and the Agency Administrator, usually through the Resource Advisor.
- The incident or host authorities must immediately contact specialists within the local jurisdiction.
- Notifications and reporting will be completed as soon as possible.

Procedures have been implemented for the required reporting. All information, including reporting tools and instructions are posted on the USFS Interagency Wildland Fire Chemicals Policy and Guidance website on fire retardant at: https://www.fs.usda.gov/managing-land/fire/chemicals.

The USFS has additional reporting requirements for TEPCS and USFS listed sensitive species for aerially delivered fire retardant only. This requirement resulted from the Forest Service's acceptance of biological opinions received from the National Marine Fisheries Service (NMFS), the DOI Fish and Wildlife Service (FWS), and the 2011 Record of Decision for Nationwide Aerial Application of Fire Retardant on National Forest System lands. The procedures, reporting tools, and instructions can be found on the USFS Interagency Wildland Fire Chemicals Policy and Guidance website.

Endangered Species Act (ESA) Emergency Consultation

The USFS has completed consultation with regulatory agencies (FWS and NMFS) for aerial delivery of fire retardant only on National Forest System lands; please refer to the USFS fire retardant website at: https://www.fs.usda.gov/managing-land/fire/ for additional information and re-initiation of consultation requirements.

Other agencies have not completed this consultation. In the event of a retardant application into a waterway or other TEPCS species habitats on non-USFS lands, the action agency must comply with the emergency section 7 consultation procedures of the ESA for wildland fire chemicals.

Where TEPCS species or their habitats are potentially affected by application of wildland fire chemicals, the action agency must determine if any adverse effects to a species or their habitat occurred.

If the action agency determines that there are adverse effects on TEPCS species or their habitats then the action agency must consult with FWS and NMFS, as required by 50 CFR 402.05 (Emergencies). Procedures for emergency consultation are described in the *Interagency Consultation Handbook*, Chapter 8 (March 1998). In the case of a long duration incident, emergency consultation should be initiated as soon as practical during the event. Otherwise, post-event consultation is appropriate. The initiation of the consultation is the responsibility of the unit administrator.

Chapter 6 – Aerial Supervision Mission Procedures

Aerial supervision operations are conducted in demanding flight conditions in a high workload and multi-tasking environment. Because of this, standardization of procedures is important to enhance safety, effectiveness, efficiency, and professionalism. This chapter addresses common procedures to be observed by all aerial supervisors as well as specific guidance for LPIL ASM, ATGS, and HLCO personnel.

The actions listed below pertain to all positions of aerial supervision. Methods for performing these actions differ and are often refined as CRM is enhanced.

Pre-Mission Procedures

Pilot Qualification Card and Aircraft Data Card

Review these cards and verify the pilot and aircraft are authorized for air tactical missions.

Flight and Duty Limitations

Determine when a pilot's duty day began and if sufficient flight and duty time remains. Order a relief pilot as appropriate regarding flight or duty limitations.

Aircraft Maintenance

Verify aircraft has sufficient time remaining before next scheduled maintenance. If not, order another aircraft.

Aircraft Preparation

Pilot Preflight Responsibilities

Include, but are not limited to:

- Inspect preflight aircraft.
- Calculate weight and balance of passengers and equipment.
- Calculate aircraft performance specific to the aircraft configuration and field conditions.
- Fueling: Discuss fuel requirements and limitations for mission with ATGS. Ensure proper fueling.
- Review PPE per contract.
- File a flight plan as needed.
- Obtain an adequate weather briefing.
- Cover aircraft checklist expectations with Aerial Supervisor.

ATGS and AITS Preflight Responsibilities

- Inspect communications system. Install auxiliary radio if required.
- Program VHF-FM tactical frequencies in radio and coordinate with pilot.
- Perform a radio check with dispatch and airbase before flying.
- Load aerial supervision kit and gear into aircraft.

- Assist pilot as requested with duties.
- Communicate destination and other applicable intended route of flight with PIC.
- Understand aircraft performance, including takeoff distance, landing distance, single-engine performance, max gross weight, and fuel endurance). Document findings.

Procurement Agreements

The Aerial Supervisor should be familiar with the basic terms of the procurement agreement or contract.

Obtain a Mission Briefing

Whether the air tactical mission is IA or a project incident, all types of aerial supervision personnel must obtain pertinent incident information. Dispatch centers must provide an aircraft dispatch form.

IA Briefings

The following information is recorded on an aircraft dispatch form and is recommended before responding to an incident:

- Incident name or number
- Agency responsible
- Incident location: legal location, latitude and longitude, and VHF Omnidirectional Range (VOR)
- Frequencies and tones: double check operating mode (N, W, D) and tones
- Flight following
- Air-to-Ground
- Air-to-Air (FM and AM)
- Contacts: ground and air
- Air resources assigned or to be assigned, Estimated Time En route (ETEs), type, and identifier
- Other resources dispatched, as practical
- Approximate incident size and fire behavior
- Other available air resources
- Aerial and ground hazards
- Special information such as land status, watershed, wilderness, and urban interface
- Airtanker reload base options and turnaround times

Extended Attack Briefings

If possible, aerial supervision personnel should attend incident briefings. If this is not possible, critical information should be relayed by phone, radio, email, fax, or messenger. A copy of the Incident Action Plan (IAP) is preferred. Aerial supervision personnel may have to seek some of this information:

- Incident objectives by division found on Division/Group Assignments List (ICS 204)
- Organization Assignment List (ICS 203) or list of key operations people
- Air Operations Summary (ICS 220) or list of assigned aircraft

- List of all aircraft by make and model and identification
- Incident Radio Communication Plan (ICS 205) or list of frequencies
- Incident map
- Fire behavior report and local weather
- Air resource availability and status
- Incident medevac plan and medevac helicopter assigned

Mission Safety Briefing for Pilot

Prior to departure on an air tactical mission, the Aerial Supervisor will brief the pilot on the following:

- General scope of the mission
- Incident location: latitude-longitude and bearing-distance
- Resources assigned
- Radio frequencies
- Special information including hazards and military operations
- Expected duration of mission
- Intended destination airport

Pilot Pre-Takeoff Responsibilities

- Complete the appropriate aircraft checklists
- Complete preflight including passenger safety briefing
- Initiate mission checklist with Aerial Supervisor
- Confirm fuel quantity
- Obtain route clearances through SUA as required
- Program GPS to incident location

ATGS and AITS Responsibilities

- Obtain, record, and set local altimeter setting from pilot or airport advisory.
- Program radios (AM and FM) – Check with pilot before programming the AM.
- Confirm fuel quantity and estimated flight time available for mission.
- Check with dispatch regarding status of military aviation operations (Restricted, MOAs, MTRs) and TFRs.
- Assist with start, taxi, and pre-take-off checklists, as requested by the PIC.

En Route Procedures

After Take Off

- Record take-off time (take-off roll)
- Observe sterile cockpit protocol as previously agreed to with pilot
- Establish flight following:
    - Call sign
    - Departure location
    - Number on board
    - Fuel on board (hours)
    - ETE
    - Destination
    - Confirm AFF

Example:

"Boise Dispatch, Air Attack 1SA on National Flight Follow."

"1SA, Boise Dispatch."

"Air Attack 1SA is off Boise, 2 on board, 4.5 hours fuel, 15 ETE to the Beaver Incident, confirm AFF?"

"1SA, Boise dispatch copies, and you're positive AFF."

"Air Attack 1SA copies."

- Notify pilot of any information or situation affecting the flight.
- Assist pilot as requested. Be an active crew member.
- Complete Mission Checklist.

En Route Communications

Maintain communications with dispatch and other aircraft concerning:

- Incident air resource updates
- Status of SUA (TFR and MOA, among others)
- Coordination with responding air resources can be done on the assigned air-to-air frequency provided it does not interfere with operations over the incident.
- Monitor the fire frequencies to enhance situational awareness before arrival.

FTA Entry Procedures

12 nm from the center point of the incident, aerial supervision personnel must follow the FTA entry procedures listed below. There are three scenarios: 1) Aerial supervision is on scene; 2) Aerial supervision is not on scene, but other aircraft are; or 3) there are no aircraft on scene.

Scenario 1: Aerial Supervision is On Scene

- Change to incident frequencies.
- Give 12-mile radio call to Aerial Supervisor. Provide your location and altitude.
- Obtain clearance:
  - Altimeter setting
  - FTA clearance altitude
  - Altitude of Aerial Supervisor
  - Altitudes of other aircraft
  - Hazards
- Read back and enter the incident airspace, as briefed.
- Watch for on-scene aircraft and call out a distance and clock reference when in sight.
- Receive transition briefing and confirm positive handoff of Aerial Supervisor responsibilities.
- Outgoing Aerial Supervisor will notify dispatch and incoming Aerial Supervisor will notify IC or ground personnel and confirm objectives and priorities.

Scenario 2: Aerial Supervision is not On Scene, but Other Aircraft are On Scene

- Change to incident frequencies.
- Give 12-mile call in the blind on assigned air-to-air frequency. Call receiving unit, give your call sign, location, altitude, intent, and frequency. An on-scene aircraft should respond using the assigned primary air-to-air frequency.
- Obtain clearance into FTA by getting:
  - Altimeter setting
  - FTA clearance altitude
  - Altitudes and locations of other aircraft on scene
  - Hazards
- Read back and enter the incident airspace, as briefed with on-scene aircraft.
- Watch for other aircraft and call out a distance and clock reference when in sight.
- Get status of all on-scene aircraft including location and mission type, among others.
- Call IC and get objectives and priorities.
- Notify dispatch you are on scene and now the incident Aerial Supervisor.

Scenario 3: There Are No Aircraft on Scene

- Give 12-mile and 7-mile calls in the blind on the primary and secondary assigned air-to-air frequencies. Provide the following:
    - FTA/TFR Calls in the Blind Script
    - Receiving unit
    - Call sign
    - Location
    - Altitude
    - Intent
    - "Any traffic please advise"
    - Frequency

Example: "Beaver fire traffic, Air Attack 0DT, 12 miles to the southwest, 6500, inbound, any traffic please advise 122.925."

- Call the IC or ground personnel on the assigned FM air-to-ground frequency and verify no other aircraft are on scene.
- Proceed to the incident. Maintain at least 2,500 feet AGL and watch for other aircraft.
- Obtain center point and record size-up information.
- Call dispatch, notify you are the on-scene Aerial Supervisor and provide size-up.
- Call the IC or ground forces and establish objectives and priorities.

Entering Incident Airspace

ATGS fixed-wing enters the airspace in a right-hand orbit at 2,500 feet AGL unless the situation dictates a different altitude (for example, excess smoke and mountainous terrain). LPILs and ASMs enter in a left orbit, or as directed by Aerial Supervisor.

TFR Entry Procedures

All assigned and ordered aircraft must obtain clearance into the incident TFR by the on-scene Aerial Supervisor or the official in charge of the on-scene emergency response activities.

- An Interagency Resource Ordering Capability (IROC) order or *Aircraft Dispatch Form*, PMS 250 is **not** a clearance into a TFR.
- The first responding aircraft, typically on extended attack incidents, must have reasonable assurance that there are no other aircraft in the TFR by making blind calls on the TFR frequency, other assigned air-to-air frequencies, and double-checking with ground personnel (IC, OPS, or helibase).
- There may be multiple aircraft operations areas within a TFR.

- Remember – non-incident aircraft may enter the TFR under the following conditions:
  - The aircraft is carrying a law enforcement official.
  - The aircraft is on a flight plan and carrying properly accredited news representatives.
  - The aircraft is operating under the ATC approved IFR flight plan.

The operation is conducted directly to or from an airport within the area, or is necessitated by the impracticability of VFR flight above or around the area due to weather, or terrain; notification is given to the FSS or ATC facility specified in the NOTAM to receive advisories concerning disaster relief aircraft operations; and the operation does not hamper or endanger relief activities and is not conducted for observing the disaster.

Aerial Supervisor On-Scene Responsibilities

The Aerial Supervisor Must:

- Watch for aircraft and make visual and radio contact with each one.
- Determine ground elevation and mission flight altitudes to establish FTA altitudes for incoming aircraft including helicopters, airtankers, LPIL/ASM, smokejumpers, relief Aerial Supervisor, and media if not previously determined.
- Determine flight hazards – Power lines, antennas, snags, terrain, thunderstorm activity, excessive wind, poor visibility, and airspace conflicts, among others.
- Confirm incident objectives and priorities with the IC/ground personnel.

Standard Briefings

All aircraft will receive briefings:

Initial Briefing

<u>Clearance to Enter</u>

- Altimeter setting. "2992
- Clearance altitude. Cleared in 7000
- ATGS altitude. Air Attack is at 8000
- Other aircraft altitudes. 2 copters at or below 6000
- Hazards. Power lines south side ridge top"

Example: "Tanker one-four, altimeter two nine-nine two, cleared in three thousand five hundred, air attack is four thousand five hundred, one helicopter at, or below two thousand five hundred, caution power lines."

Tactical Briefing

Orientation

Specific Hazards

Objectives

- Direct, indirect, parallel, pretreating, point protection, or applicable terminology to explain what is to be accomplished and why.

Target Description

- Concise communication using standard terminology expedites the task and increases safety.
- A standard target description includes the following:
  - Target location
  - Coverage level and portion of load
  - Drop objectives and type of drop
  - Hazards

Methods to Describe Work Location

Long Range (Greater Than 12 Miles)

- GPS reference points – in limited visibility (inversions), latitude, and longitude references can significantly increase safety while reducing radio traffic.

Note: Be aware that the standard datum and coordinate format aviation GPS equipment is World Geodetic System (WGS) 84 and decimal minutes whereas many GPS units used by ground personnel default to a North American Datum (NAD) 83 datum and are in degrees, minutes, and seconds format. The use of different data and formats may result in misinterpreting the location of a specific target. Ensure that the target location is confirmed with ground personnel.

Medium Range (1 to 12 Miles)

- Fire anatomy: Left and right flank, head, and heel (tail in Alaska), among others
- Elevation: Specify above sea level (MSL) or AGL.

Short Range (Less than 1 Mile)

Geographic features: Ridges, saddles, spur ridges, lakes, and streams, among others

- Specific activity: Dozer working, firing operation, parked vehicles, and previous drop, among others
- Incident features: Helibase, helispots, fireline, and division breaks, among others
- Use standard terminology: See the *NWCG Glossary of Wildland Fire*, PMS 205, https://www.nwcg.gov/publications/pms205.

Guiding Aircraft to Targets

- Clock directions, left, or right, among others
- Signal mirrors, ground panels, and lights, among others
- Have an on-scene aircraft lead a new aircraft to the target area.
- Discuss target locations when the other aircraft is in position to observe.

Example:

ATGS: "Tanker one-four, do you have the existing retardant line?"

Airtanker: "Tanker one-four, Affirmative"

ATGS: "Objective is direct line, tag and extend, coverage level eight, full load, exit straight out, caution power lines along the road"

Airtanker: "Tanker one-four has the target"

Table 6. Clearance to Maneuver Script

ATGS Script	Airtanker Script
"Clear to Maneuver"	
Observe: Acknowledge when able	***Call** "Downwind"
Observe: Acknowledge when able	***Call** "Base"
Observe: Acknowledgment required	**Call** "Final"
"I have your final." "Clear to drop"	

* When approved for non-standard right-hand patterns the airtanker will preface each flight leg call with "Right."

Note: The ATGS is required to clear airtankers to "maneuver" and airtankers to "drop." ATGS are not required to acknowledge downwind and base legs. Every attempt should be made for the ATGS to visually observe and acknowledge airtankers flight patterns once an airtanker is cleared to maneuver until drop sequence is complete.

Definition

<u>Clear to Maneuver</u>

The pilot is cleared to leave the orbit altitude and maneuver the aircraft as needed for the drop.

<u>Clear to Drop</u>

On line for target, line is clear, and clear to drop.

<u>Go Around</u>

At any time, a "go around" may be communicated by anyone (aerial supervisor, ground personnel, airtanker, and helicopter, among others) for the safety and efficiency of the operation. During a go around, the airtanker should:

- Re-establish downwind, or
- If a load was released, exit the FTA following the exit brief.

Note: If the Aerial Supervisor does not affirm the final or call clear to drop, a go around should be done. At any time, the airtanker may need to release the load for safety-of-flight.

Example:

ATGS: “Tanker one-four, you are cleared to maneuver.” or “Tanker one-four, you are cleared right-hand-maneuver.”

Airtanker: “Tanker one-four is downwind.” or “Tanker one-four is on a right-downwind.”

Airtanker: “Tanker one-four is base.” or “Tanker one-four is on a right-base.”

Airtanker: “Tanker one-four is on final.”

ATGS: “Tanker one-four, I have your final; clear to drop.”

Right-Hand Drop Pattern

Right-hand patterns will never be executed at the airtanker entry or orbit altitude. When in right-hand drop patterns, airtankers will call “right-downwind,” “right-base.”

Departure Briefing

Drop Evaluation:

- Start
- Line
- End

Instructions:

- Load and return, hold, or release
- Location
- Special instructions

Example: “Tanker one-four, half load late, off one wingspan right, load, and return.”

Emergency Brief

- Consider load
- Acknowledge and maintain visual
- Communicate

Example: “Tanker one-four, consider load, I have you in sight, helicopter five-oh-two hold position, tanker traffic; I’ll notify dispatch.”

Leadplane Scripts

Leadplane Training Scripts

Leadplane training scripts are the foundation of communication between LPIL trainees and airtanker pilots. The leadplane mission is very complex. The ability to communicate information at the right time is essential to becoming a qualified Leadplane Pilot. It is expected that mission evaluators will use the scripts until students demonstrate mastery, and that students will memorize script and leg associations to maximize training. Additionally, evaluator and student use of the scripts will minimize leadplane mission evaluator inconsistencies when students move from one evaluator to another. For more information on leadplane scripts and the lesson plans associated with the scripts please refer to the N-9065 National Interagency Leadplane Pilot training course.

Initial Clearance to Enter (Standard Script Refer to Chapter 6 Aerial Supervision On-Scene Responsibilities)

- Altimeter setting: "2992"
- Clearance altitude: "Cleared in at 7000"
- ATGS altitude: "Air Attack is at 8000"
- Other aircraft altitudes: "2 copters at or below 6000"
- Hazards: "Power lines south side of ridge"

Join-Up

The join-up is the maneuver that initiates positive communication and separation between the leadplane and the airtanker. As the two aircraft will be converging, it is imperative that the join-up be conducted at a minimum of 500 feet of vertical separation and that location and altitude of the leadplane are briefed until separation responsibilities fall to the airtanker pilot.

Visual Contact:

- Tanker number: "Tanker 123"
- Clock location: "At your 11 o'clock"
- Altitude in feet: "6500"

At 2 miles:

- Tanker number: "Tanker 123"
- Clock location: "At your 11 o'clock"
- Altitude in feet: "6500"
- Positive confirmation: "Here is a wing and smoke"

Tactical Brief: occurs on the leg from the join-up to the drop

- Brief drop objective: "Working direct, left shoulder, tagging, and extending existing retardant, coverage level 4"

Down Wind

Establish the leg. This contributes to being predictable and aids in target description. If no show-me is required brief speeds and the exit on this leg.

- LEG/Profile: "Downwind for show-me or live run"
- Drop heading in degrees: "Drop heading is 165"
- Drop altitude in feet: "Drop altitude 4300"
- Speeds: "What speeds would you like?"
- Exit: "On the exit I'll be up and left, you'll be straight out."

Abeam – This call is to aid in target description and situational awareness.

- "Abeam"

Turning Base

After establishing a leg, subsequent calls will communicate intentions

- Turning base profile: "Turning base for show-me or live run"
- "Start at the buckskin snag"

Turning Final

- "Turning final"

Final

- "This is the line, start here"
- "At the snag, start here"

Exit

For show-me profile, re-establish positive communications and separation:

- "On the exit, I'll be up and left and you'll be straight out."
- "Keep me in sight and I'll meet you at 6500."
- "What speeds would you like?"

Off the run with 20 degrees of bank and flying the requested speeds set you up for the correct downwind.

Downwind – re-establish the leg

- "Downwind"
- "Abeam"

Turning Base

- "Turning base"

Turning Final

- "Turning final"

Final

- "This is the line"
- "Start here"

Aircraft Separation

Terrain, visibility, number, and type of aircraft, TFR dimensions, and other factors influence requirements for maintaining safe separation.

Working Area and Area of Operation (WA/AO)

WA/AOs are areas where an identified project or task is being accomplished (for example, crew support, reconnaissance, logistics, retardant delivery, ground firing support, aerial ignition, troop shuttle, jump operation, and Unmanned Aircraft Systems (UAS), among others) with one or more aircraft. Because incidents often have several active WA/AOs with different operating altitudes (based on terrain), aerial supervision resources assign routes, patterns, checkpoints, fences, IPs, holding areas, and altitudes to

deconflict travel routes between WA/AOs and aircraft bases.

Common Principles of Aircraft Separation

- Use standard aviation 'see and avoid' VFR.
- Use the appropriate air-to-air frequency for position reporting.
- Adhere to FTA procedures.

Aerial Supervisors Ensure Aircraft Separation By:

- Structuring the incident airspace and briefing pilots.
- Monitor radio communications for:
  - Pilot-to-pilot position reports.
  - Blind call position reports.
  - Tracking aircraft.
  - Giving specific directions to pilots as needed.
  - Advising pilots on the location and heading of other aircraft.

Note: The coordinates of the incident or IP must be verified, updated, and communicated to dispatch to ensure that inbound incident aircraft can determine the appropriate points at which to initiate initial contact or hold if communications with controlling aircraft are not established.

Vertical Separation

500 feet is the minimum vertical separation for missions in the same airspace. The preference is 1,000 feet and should be used whenever possible.

- Assign helicopters a hard ceiling (for example, at or below 4,500 feet). Do not assign them 500 feet AGL or "low-level."
- Vertical stacking of airtankers is not approved. Utilize an orbit altitude racetrack pattern.
- It is common practice to put media helicopters above the fixed-wing ATGS orbit to keep them separated from firefighting aircraft.
- Standard operational altitudes and patterns are in Table 7.

Table 7. Standard Operational Altitudes and Patterns

Mission	Standard AGL (feet)	Standard Pattern
Media	3,500	Right or left
ATGS – Fixed-Wing	2,500	Right
ATGS – Helicopter	500 to 2,500	Left
HLCO – Helicopter	500 to 1,000	Right or left
Airtanker/Water Scooper Orbit	1,500	Left
Airtanker/Water Scooper Maneuvering	150 to 1,000	Left
LPIL	150 to 1,000	Left
Helicopters	0 to 500 (hard ceiling)	Left or right
Smokejumper Ram-Air Chute	3,000	Left
Smokejumper Round Chute	1,500	Left
Paracargo	150 to 1,500	Left
Streamers	1,500	Left

Horizontal Separation

- Aerial supervision must ensure there is adequate visibility to conduct operations safely regardless of the airspace classification.
- Flight patterns must be adequate.
    - Consult pilots before finalizing patterns and routes.
    - Advise pilots on location of other aircraft if visual contact has not been reported.
    - Air-to-air frequency must be clear for pilots to give position reports.
    - Geographic references, such as a ridge or a river, can be used as a virtual fence to separate aircraft, provided aircraft maintain assigned flight patterns.
    - Near geographic dividing lines (virtual fence): If simultaneous operations are near the dividing line conflict, missions must be sequenced to ensure adequate separation.

Virtual Fences

Effective for managing airspace with minimal radio traffic on the air-to-air frequency.

Pilots may be required to report arrival at a virtual fence and wait for clearance from Aerial Supervisor before proceeding. Geographic locations that make effective checkpoints and virtual fences include:

- Roads
- Power lines
- Ridges
- Lakes
- Rivers

Routes

Establish point-to-point flightpaths for repetitive missions from helibase to helispots, sling sites, dip site to targets, and scoop site to target, among others. For safety, efficiency, and monitoring, the Aerial Supervisor will ensure flight routes and communications procedures have been established and are known to all participating aircraft and personnel to include helicopter pilots, scooper pilots, and helibase personnel, among others.

Defined Routes

May include going up one stream and down another, up one side of drainage and down the other side, up one side of a spur ridge and down the other, among other routes.

Daisy Chains

Two or more helicopters can be assigned to the same targets and dip sites for repeated water drops. The Aerial Supervisor, in consultation with helicopter pilots, will establish a "daisy-chain" flight route for these operations ensuring helicopters and scoopers maintain the same orbit direction and separation.

Helicopter Reconnaissance Flights

Helicopter recon flights can be difficult to monitor. Consider the following procedures to maintain safe separation of aircraft:

- Schedule recon flights during slow periods.
- Assign a specific route for the recon (clockwise, maintain assigned altitude).
- Establish check points and clearance protocol with recon aircraft.

Incident Entry and Exit Corridors

Aerial Supervisor shall determine incident entry and exit corridors as needed. All aircraft must be notified of corridors. If an entry corridor and exit corridor cannot be separated horizontally, then they must be separated vertically.

IPs, Checkpoints, and Holding Areas

The Aerial Supervisor assigns incoming aircraft to non-conflicting airspaces, or holding areas, as needed. Coordinates or geographic references work best.

IP

An IP is an initial fixed-wing reporting location clearly identified by the Aerial Supervisor that is relayed to dispatch and communicated to all responding fixed-wing resources It may be a latitude-longitude or geographic point (landmark). IPs are used to route incoming aircraft to a known location before engaging in tactics.

- Aircraft entering IPs will announce their direction of approach and intended destination via call in the blind script on the assigned primary air-to-air frequency.

Checkpoint

A reporting location clearly identified by the Aerial Supervisor. Mandatory reporting checkpoints require a clearance to cross.

- Route aircraft to and from assignments.
    - Aircraft using checkpoints while transitioning on an established route will announce their direction and intended destination via call in the blind on the assigned air-to-air frequency.
- Sequencing aircraft— Checkpoints used for sequencing must:
    - Be safe from other aircraft.
    - Locate where pilots being sequenced can see the WA/AO and other aircraft.
    - Be close so that the time from the clearance ("cleared to target") to the aircraft that is clear of the target is short.
- Common checkpoints are:
    - Distances (at 12 miles, edge of the TFR)
    - Geographic locations (ridges, rivers, ponds, red roof barn, lookout tower, scoop, dip)

  Watch outs:
    - Time checkpoints are primarily used for ground clearances. ("FireBoss 218 is 5 minutes out"). Time checkpoints are generally too vague for aircraft routing or sequencing.
    - Pilots prematurely call the checkpoint prior to arrival.
    - Checkpoints like dips or scoops that are outside of the WA/AO require an intermediate checkpoint.

Holding Areas

Aerial supervisors can use any known location to hold aircraft. There can be multiple areas on an incident being used at the same time for multiple aircraft at different locations.

- Pilots must be aware of other aircraft in their assigned holding area.
- Pilots must be able to communicate position reports to each other.
- Holding area must be clearly defined by a geographic reference point or distance and direction relative to the incident aircraft. This will normally establish a "racetrack" pattern where they are flying at the same altitude and providing their own visual separation.
- Aircraft must receive clearance to depart the holding area once assigned.
- Helicopters can be held on the ground or in the air as needed to maintain adequate separation. Considerations include:
    - Pilots should be able to maintain forward flight rather than constant hover.
    - Long periods of holding helicopters should be done on the ground.

Sequencing

Sequencing is a technique used to deliver multiple aircraft to a shared target area. Sequencing can be done between fixed and helicopter aircraft to the same target area but should be actively managed by an Aerial Supervisor. Aerial supervisors should establish an order and provide clearance for each aircraft to the target ordrop area.

Sequencing Clearances

- "Cleared to target." or "Cleared to target number 2, 3, etc."
    - Denotes an aircraft is cleared to a target or drop area.
- "Cleared to transition."
    - Denotes an aircraft is cleared through the WA/AO on the way to the helispot or sling spot, back to helibase, on a recon, or scoop site.
- "Cleared unrestricted."
    - Denotes to an aircraft that the active sequencing has stopped and there is no longer a need to call for clearances at the designated checkpoint.

Note: By using this specific language, the situational awareness for all aircraft in the FTA will be improved. The sequencing clearances should not be confused with "cleared in" call, which denotes the clearance for an aircraft to enter the FTA or TFR.

Caution:

Consider wake turbulence when sequencing any type of aircraft. VLATs require a minimum 3-minute delay for wake turbulence.

Example:

Beaver Air Attack: "Helicopter five-two-five, call your dips, drops, and call for clearance at Rock Check."

Helicopter 525: "Helicopter five-two-five is off the dip."

Helicopter 525: "Helicopter five-two-five is at Rock Check."

Beaver Air Attack: "Helicopter five-two-five clear to target, number 2 behind tanker one-zero-one on left base, caution wake turbulence"

Helicopter 525: "Helicopter five-two-five has visual on tanker one-zero-one, clear to target number 2"

Airtanker 101: "Tanker one-zero-one is turning final"

Beaver Air Attack: "Tanker one-zero-one, I have your final, clear to drop. You'll have a helicopter off to your left with reported visual on you"

Airtanker 101: "Copy clear to drop, I have the helicopter on my left"

<u>Air-to-Air Communications</u>

Pilots must monitor the assigned air-to-air frequency to receive direction and maintain aircraft separation. If needed, separate air-to-air frequencies for helicopters and airtankers. The primary air-to-air frequency should be retained for fixed-wing operations.

Intersecting Routes

Intersecting aircraft routes shall be clearly identifiable geographically. Intersections shall have a minimum of 500 feet of vertical separation.

Non-Standard Patterns

Occasionally terrain, visibility, wind direction, or other factors require patterns that are modified or reversed.

The mission pilot, airtanker, LPIL or ASM, or HLCO shall advise the Aerial Supervisor of the situation and request a deviation from standard procedures. The Aerial Supervisor will advise other aircraft before granting the request and notify appropriate incident aircraft of the deviation when the non-standard maneuvers are complete.

Coordination Between Aerial Supervisors

Each incident is unique, and circumstances dictate that workload shifts between LPIL, ATGS, HLCO, and ASM as their responsibilities overlap in several areas. Operational continuity is achieved by briefing and positive hand off.

It is important that ATGS, ASM or LPIL, and HLCO work as a team and share workload commensurate with fire complexity, training, and position authority.

Positive Hand-Off of Aircraft

Anytime aircraft is handed off (whether requested or offered) to another aerial supervisor, both aerial supervisors first must agree to and confirm the handoff. A positive hand-off consists of a three-step process where the call sign(s) of the aircraft are used.

Example:

(AA) “Bravo-four, I’d like to hand off helicopter one-echo-echo and helicopter five-three-one for you to coordinate and sequence between airtankers.”

(B-4) “Roger. Bravo-four has control of helicopter one echo echo and helicopter five three one.”

(AA) “Affirmative.”

Airtanker Mission Sequence Between ATGS and LPIL/ASM

- ATGS and ground operations jointly determine tactical objectives.
- ATGS briefs LPIL/ASM on next target, coverage level, and other pertinent information
- Airtanker makes 12-mile check-in with ATGS or LPIL as agreed upon by the aerial supervisors.
- LPIL/ASM briefs airtanker on target, coverage level, and other pertinent information
- ATGS, ASM, or LPIL clears conflicting air resources from the airspace and gives verbal clearance to LPIL or ASM for low-level operations. The ATGS may also elect to hand off conflicting air resources to LPIL or ASM to reduce radio traffic.
- ATGS, ASM, LPIL clears ground personnel from target area.
- ATGS will maintain radio silence on the primary air-to-air while LPIL/ASM and airtanker are working, particularly when on final approach or exiting the drop area, unless the drop needs to be called off.

- LPIL/ASM will do low-level recon to determine hazards, targets, elevations, location of people, equipment, facilities, safe patterns, exit routes, and other pertinent information.
- LPIL/ASM briefs airtanker on objectives, flight route, coverage level, drift potential, and hazards.
- LPIL/ASM may make a "show-me" run with airtanker in tow on the intended target.
- ATGS/ASM/LPIL confirms ground personnel are clear of target area.
- Airtanker makes drop(s). Airtanker may or may not require a lead.
- ATGS pilot positions aircraft to monitor and evaluate drop.
- ATGS evaluates drop and gets ground feedback. LPIL/ASM may also be able to evaluate drop. Evaluation includes accuracy, coverage level, coverage uniformity, etc. Evaluation may reveal the need to adjust to left or right or begin earlier or later. These adjustments are expressed in wingspans or rotor-spans, not feet or yards.
- ATGS/ASM/LPIL gives feedback to the airtanker after clear of drop area (LPIL/ASM and airtanker may have already heard the same feedback from ground if they are monitoring assigned air-to-ground frequencies).
- LPIL/ASM and airtanker adjust as needed on subsequent drops.
- LPIL/ASM gives airtanker reload instructions based on instruction from ATGS.
- ATGS/ASM/LPIL informs ground when it is clear to return to work area.
- Airtanker informs dispatch on status including load and return or hold.

Maintaining Air Tactics Continuity

Complex air operations or air operations involving a mix of air resources require continuous supervision by an ATGS, ASM, LPIL, or HLCO. To maintain continuous supervision, the following procedures should be followed. Good planning will ensure continuity:

- Use ASM to fill gaps in ATGS coverage and manage air and ground operations in designated areas on complex incidents.
- Stagger aircraft refueling so all aircraft are not down simultaneously.
- Monitor flight times. Anticipate the need for a relief pilot, LPIL, or other air resources. Notify dispatcher or AOBD in a timely manner.
- Anticipate fuel needs.
- Recommend activation of portable reload bases to reduce turnaround time.
- Coordinate refuel and relief needs between aerial supervisors to ensure continuity of airspace management and supervision.

Relief Guidelines

Aerial supervision is mentally demanding. Long flight hours result in mental fatigue and reduced effectiveness. Consider the following staffing guidelines:

- If the Aerial Supervisor will fly more than 4 hours on any one flight, order a relief.
- On multi-day incidents, assign a second Aerial Supervisor and rotate.

Diversion of Aerial Resources

Higher priority incidents may require diversion of aircraft. A reassignment may be given through dispatch or through IC and Operations. Incident tactics may have to be modified. Aerial supervision may also be diverted to manage the new incident. Upon receiving a divert notice, the Aerial Supervisor must release and brief the requested resources using the standard dispatch form information:

- Incident location.
- Air and ground contacts.
- Radio frequencies.

No Divert Request

The IC can request through dispatch a "no divert" for airtankers when an imminent threat to life exists. This requires 30-minute re-evaluation with IC and dispatch. A no divert status shall be released as soon as the threat is mitigated.

Note: Check the Geographic Area Mobilization Guide for specific guidance on "no divert" procedures.

Coordination with Ground Personnel

Primary Contacts

- On Type 1 and 2 incidents, aerial supervisors work with Air Operations, Operations, Division Supervisors, and other fireline personnel.
- On Type 3 and 4 incidents, aerial supervisors work primarily with the IC, Operations, other fireline personnel, or dispatch.
- Aerial supervisors provide intelligence to tactical personnel and dispatchers to facilitate the briefing process.

Size-up the Fire and Get Oriented

- Size-up the fire – Make initial assessment and communicate critical safety, strategy, and tactics inputs to ground contact or dispatch.
- Get oriented – Develop a mental or sketched map of the incident that includes:
  - Cardinal directions
  - Landmarks: Roads, streams, lakes, mountains, improvements, etc.
  - Fire flanks, head, etc.
  - Visible work accomplished: Dozer lines, handline, retardant line, etc.
  - Record GPS coordinates to identify reference points.
  - Review IAP map: note frequencies, aircraft assignments/availability, division breaks, helispots, etc. Assign air resources.
- Make assignments based on Operations/ICs strategy, tactics, & mission priorities.

Determine TFR Requirements

- Vertical and horizontal dimensions.
- If needed, order through dispatch or AOBD.

Check for Airspace Conflicts

- Identify MOAs, MTRs, airports, etc.
- Values at risk: Life, property/structures, resources.
- Current fire size and potential size estimate.
- Fuel models and rates of spread.
- Fire behavior elements (wind, terrain, aspect, etc.).

Recommend Strategies, Tactics, and Resources

- Direct, indirect, or parallel strategies.
- Target locations and priorities.
- Access.
- Anchor points.
- Water sources.
- Potential helispots.
- Location of spot fires.
- Number and types of aircraft required.
- Use of specialized resources (helitack, rappellers, smokejumpers, and paracargo).

Provide Airdrop Information to Ground Crews

- As a top priority, direct air resources to protect and aid in evacuation of endangered personnel.
- Advise personnel of airtanker, bucket, or paracargo drops in their work area and the need to clear the area.
- If drops are near power lines, determine status of lines (are they live or de-energized?). Advise ground personnel of danger of being near power lines during drops.
- Confirm with ground personnel if run is to be dry or live.
- Notify ground personnel when drop is complete, and personnel can return to work area.
- Solicit feedback from ground crews relating to drop effectiveness.
- Provide safety oversight to ground crews.
- Monitor personnel locations relative to the fire perimeter, blowup areas, etc.
- Assist with locating safety zones and escape routes. Final determination must be made from ground.
- Monitor weather – advise personnel of approaching fronts or thunderstorms.
- Advise personnel on adverse changes in fire behavior.
- Personnel and equipment in the flight path of intended aerial drops should move to a location that will decrease the possibility of being hit by the drop.

- Personnel near aerial drops should be alert for objects that the drop could dislodge, for example tree limbs, and rocks. The *IRPG* provides additional safety information for personnel in drop areas.

Determine the Procedures for Ordering Tactical Aerial Resources

- The authority to order retardant and helicopter support varies between dispatch centers, ownership, and incident complexity. Determine the procedure before the mission begins and confirm with the IC.
- On extended attack incidents, Division Supervisors are typically delegated the authority. However, consult with AOBD/OSC.
- On IA incidents, the IC makes aircraft orders. The IC may choose to delegate this to the Aerial Supervisor. Confirm before ordering.

Coordination with Dispatch

Provide dispatch the following information in a timely manner:

- A fire size-up, including a center point and resource needs.
- Horizontal and vertical dimensions of a TFR if needed. Remember that TFRs are based on degrees, minutes, and seconds. Dispatch centers may assist with conversion of latitude-longitude.
- Airspace conflicts with civilian or military aircraft.
- The need for airtankers to load and return or hold.
- Aircraft incidents and accidents.
- Projected needs for next shift including number of aircraft by type, time requested, frequencies, TFRs, etc.
- Aerial supervision flight and duty hours used and projected needs to complete the mission.
- Advise on the need for aircraft maintenance and projected availability for next day.
- Advise if airtanker has in-flight difficulty and needs to abort the load and return to base.
- Request aerial supervision relief two or more hours before you need it.

Transition Briefings

The responsibility of the current Aerial Supervisor is to provide a quality transition briefing to the incoming Aerial Supervisor. Incoming aerial supervision should listen to assigned frequencies in route to gather situational awareness. During transition briefing, each pause should be acknowledged back with affirmation that the message is received.

Elements of a Transition Brief

- Frequencies – Confirm all assigned frequencies.
- Operational objectives – Priorities (first, second, third…), chain of command.
- Fire anatomy – Hazards, Division/Group Supervisor (DIVS)/Branch, dip site/Mobile Retardant Base (MRB), IP, checkpoints, routes, roads, helispots, retardant avoidance, etc.
- Resource – Aircraft, engines, crews, airtanker bases, ground contacts, UAS, helibase, etc.

- Tasks – Point protection, aerial ignition, firing, direct or indirect, recons, repeater mission, etc.
- Questions – Open up for incoming ATGS to ask questions.
- Aerial supervision relief times – Local time will be used, and time is estimated time of arrival (ETA) over the fire.
- Positive handoff – Incoming ATGS assumes fire name air attack and takes all fire frequencies; outbound ATGS goes back to tail number air attack and communicates transition complete and relief order to dispatch.

Note: Plan and order what is needed for briefing frequencies, tactical frequencies, etc. and include in transition. Keep frequency open to leads and ASMs for Airtanker operations. Example:

Incident ATGS: "Air Attack one-sierra-alpha, Rock Air Attack on 122.925. Do you have the assigned frequencies?"

Incoming ATGS: "Yes."

Incident ATGS: "On scene is tanker one-zero-three and helicopter five-four-echo. One additional tanker and helicopter on order no fill information. No observed hazards."

Incoming ATGS: "Copy."

Incident ATGS: "We have two divisions, Alpha, and Zulu. Priority is retardant and buckets in Division Zulu working with Engine four-twenty-two."

Incoming ATGS: "Copy."

Incident ATGS: "Priority two is a sling load in Division Alpha to Crew Three. They have not determined a sling site yet."

Incoming ATGS: "Copy."

Incident ATGS: "Questions?"

Incoming ATGS: "No."

Incident ATGS: "What time do you anticipate needing relief?"

Incoming ATGS: "If we need relief, plan on 1500, but we will confirm through dispatch."

Incident ATGS: "Air Attack one-sierra-alpha if you have the fire, I will notify dispatch."

Incoming ATGS: "Air Attack one-sierra-alpha is now Rock Air Attack."

Before Leaving the Incident

- Coordinate with remaining LPIL, ASM, ATGS, or HLCO to ensure continuity of aerial supervision and provide briefing.
- Notify Operations of Estimated Time of Departure (ETD), and who will supervise air operations if not a relief ATGS.
- Notify air resources of ETD and whom they will report to if not a relief ATGS.
- Notify the IC, Operations/Air Operations, DIVS, helibase, LPIL, ASM, and HLCO when departing.
- Notify dispatch of ETE to base.

- If you are on the last shift of the day:
  - Plan your release to allow for return within daylight hours (not necessary for twin-engine aircraft).
  - Update Operations personnel on fire status.
  - Remind remaining aviation resources of daylight restrictions, if applicable.
  - Coordinate with dispatch the status of air resources – rest overnight (RON) or return to home base. Inform air resources of RON locations.

Emergency Procedures

Flight Emergencies for On-Scene Aircraft

When a flight emergency is declared (i.e. "Mayday, Mayday, Mayday") the Aerial Supervisor manages the emergency using appropriate procedures from the list below:

- The emergency is the highest priority until aircraft lands safely.
- Determine pilot's intentions for managing situation.
- Clear the airspace for the pilot as needed.
- Dedicate and clear a frequency for the emergency.
- Jettison load if feasible.
- If problem persists, assist aircraft to return to base or alternate landing site.
- Alert incident medevac units.
- Prepare for suppression of a fire associated with an aircraft crash.
- Notify dispatch or airport tower for necessary crash and rescue protocol.

Incident Aircraft Mishap Considerations

When a mishap has occurred or an aircraft is missing, on-scene aerial supervision manages situation using appropriate procedures below:

- Consider ordering additional aerial supervision.
- Assign aircraft as needed to conduct search.
- Determine location. Check with dispatch for AFF last known coordinates and direction of flight.
- Monitor emergency frequency (121.5) if crash site is not known or if the aircraft is missing and its status is unknown.
- Assign remaining aircraft to holding areas or return to base.
- Activate incident medevac plan through medical unit.
- Assign on-site aircraft and personnel to control aircraft fire and initiate life-saving measures if they can do so without jeopardizing their safety.
- Advise IC/Operations.
- Consider suspending non-essential aircraft operations.

- Direct ground resources to crash site.
- Direct air support operations.

Medevac of Incident Personnel

Consider the following as appropriate:

- Serve as a relay between accident site, helibase, and medical personnel.
- Determine accident site location with latitude and longitude.
- Obtain medevac helicopter frequency – may be listed in medevac plan.
- Assist rescue personnel with helispot location, etc.
- Provide helispot dust abatement with helicopter buckets as needed.
- Guide medevac helicopter to accident site.

Note: IMTs and local dispatch centers typically have established procedures for incidents within the incident.

Post-Mission Procedures

- Confirm need for aerial supervision aircraft for next day and notify pilot of start of duty time, etc.
- Debrief with available flight crews (ATGS pilot, airtanker pilots, HLCO, LPIL, ASM, and helicopter pilots).
- Debrief with AOBD and dispatch.
- Attend or provide input to incident planning meeting for next day's operations.
- Request and review IAP and map for next day's operation.
- Complete payment documents.
- Submit SAFECOMs as required.
- Update ATGS logbook.
- Update contract daily diary.

Chapter 7 – Aerial Fire Suppression Strategies

Principles that apply to ground operations also apply to air operations (anchor, flank, and pinch, etc.). Strategies are based on values at risk and resource management objectives, while tactics are based on fuel type, fire intensity, rate of spread, resource availability, and estimated line production rate.

As an Aerial Supervisor, you will be making tactical decisions based on objectives developed by incident command personnel. Aerial supervisors are obligated to assist the IC and Operations personnel with strategic advice during multiple ignition events and extended attack incidents relating to aviation resource capabilities and needs.

Note: Aerial application of suppressants and retardants should be used in support of ground resources and need to be anchored.

Aerial Fire Suppression Strategies

There are three general suppression strategies:

Direct Attack

Drops directly adjacent to fire edge for retardant and directly on the fire edge for retardant, water, and suppressants, in support of ground forces. If you want retardant to land in or partially on the fire edge, it needs to be specified (half in/half out, etc.); conversely if you want water/suppressants to land directly adjacent to the fire edge, it needs to be specified (pretreat the green).

Parallel Attack

Exists parallel to and within a hundred feet of the perimeter. Anticipate lateral fire spread, safety, and line construction rates of resources assigned. This is a common practice for retardant use when ground fuels are carrying the fire as it allows time to tag on and extend prior to individual drops being hooked around by the fire.

Indirect Attack

Used to enhance control lines established by ground forces in advance of the fire. Also used for structure defense and safety zones.

Aerial Fire Suppression Tactics

A single airtanker often can make multiple drops forming a retardant line around a small fire or “V” off the head or heel.

Parallel or Stacking Pattern (Steep Ground)

When steep terrain precludes boxing a fire, flight routes must be contoured to the slope. Generally, drops start at the top and progress to bottom of the fire.

Full Coverage Drop (Delayed Attack Fires and Spot Fires)

To control fire intensity and spread, drops should blanket over the entire fire. Multiple drops may be required to get a heavy coverage level. On small fires the chance of a partial hit on the first drop is significant. It is wise to drop a partial load on the first pass. The experience of the first drop plus feedback from the ATGS and the ground will likely increase the accuracy on the next drop.

IA and Multiple Fire Operations

IA Mission Priorities

During IA, aviation resources must comply with FTA protocol. Aerial supervisors should consider the following:

IA Responsibilities with no IC

The ATGS, in consultation with dispatch, has the following responsibilities on IA incidents with no IC:

- Make initial fire size-up.
- Recommend specific resources based on fire behavior, access, response time, resource availability, and capability.
- Develop tactical plan.
- Give periodic status reports to dispatch or responding resources.
- Assist responding resources with locating the incident.
- Brief ground resources on potential safety concerns and fire behavior.
- Assign arriving resources based on tactical plan until a qualified IC arrives.

Multiple Fire Situations

An ATGS may be activated during multiple fire starts and are likely to assist with:

Fire Detection

Latitude-longitude coordinates, legal descriptions, etc.

Incident Priorities Are Based on the Following:

- Threat to life and property
- Ownership
- Fire behavior – current and expected spread
- Environmental sensitivity
- Political considerations
- Potential resource loss

Determine Access

Aerial delivery of firefighters, roads, trails, distance, and time requirements.

Recommend IA Resources

Based on resource capability, mode of access, probable availability, and response time

Develop IA Strategy and Tactics

- Based on resource objectives, fire behavior, type, and numbers of air and ground resources responding within specific time frames
- Direct resources per strategic and tactical plans until a qualified IC arrives.

- Report intelligence to dispatch and IC.
- Reassign resources to higher priority incidents if they develop.

Delayed Attack Fires

When many small fires have started in a widespread area, resources are usually in short supply. An ATGS may be assigned to assess and prioritize fires. Delayed attack fires, or fires that cannot be staffed within a few hours, may require a holding action until ground resources are available. Timely drops while the fire is small can be effective in holding or containing a fire temporarily. Retardant is much more effective than water.

During these situations the ATGS will:

- Determine delayed attack fires requiring retardant. Request resources as needed.
- Set priorities. Consider flight time between fires. If priorities are equal, consider dropping on fires that are near each other before moving to fires that are further apart.
- Direct retardant drops. Blanket covering of the entire fire is recommended when controlling both fire spread and fire intensity on small fires. While drops covering the fire reduce fire intensity, they also make burnout operations difficult if not impossible.
- Monitor status of fires and change priorities as necessary.

Wildland Urban Interface

During operations within the wildland urban interface, consider the following:

Policy and Regulations

Fires in the urban interface are considered to be in congested areas. Refer to Chapter 3 – Policies, Regulations, and Guidelines for more detail.

- Order a LPIL/ASM – As required under FAR 91.119 – USDA Grant of Exemption 392. Refer to Chapter 3 for specific requirements.
- Implement a TFR – Under 14 CFR 91.137 if the incident meets the criteria for implementation. Refer to the Interagency Airspace Coordination Guide.
- Assign an Aerial Supervisor.

Urban Interface Hazards

The following hazards to aircraft are often associated with urban interface incidents:

- Dense smoke and poor visibility
- Power lines (may have to be de-energized)
- Antennas
- Tall buildings
- Media aircraft
- Propane tanks

Ground Safety

Urban interface incidents often have many citizens and homeowners scattered through the operations area. This can seriously impair tactical air operations and expose ground personnel to additional risk.

Effectiveness of Resources

It is critical that airtanker and helicopter drops must be closely supervised to prevent inadvertent drops on non-incident persons and unnecessary damage to improvements. The Aerial Supervisor is responsible for providing the best available resources that can:

- Minimize risk to people and improvements
- Provide assignments to aircraft which have increased maneuverability, drop accuracy, and quick turnaround times to targets
- Drops are generally not effective on structures that are burning beyond the initial start phase

Urban Interface Tactical Planning Principles

Apply the following principles in developing the tactical plan for air resources:

- Assess the situation and identify the following:
  - Identify air operational hazards.
  - Locate non-incident people in operations area.
  - Protection of evacuation routes.
  - Triage structures.
  - Identify possible dipsites and portable retardant plant sites.
  - Determine how air resources can best support suppression objectives.
- Confirm that electrical transmission lines are de-energized. Don't assume that they will be. Warn ground personnel not to be under or near power lines during drops.
- Determine where airtankers or helicopters can be most effective.
- Use airtankers in areas where visibility, hazards, flight routes, and target selection ensure reasonable effectiveness and acceptable risk.
- Use helicopters on targets requiring more maneuverability and accuracy.
- When possible, avoid holding patterns with airtankers above populated areas.

Chapter 8 – Tactical Aircraft Operations

Coordination and Control

Aerial firefighting occurs in a very dynamic environment. Firefighting aircraft work in close proximity to each other, ground personnel, and surrounding terrain. This is routinely accomplished under conditions that are less than ideal, as aircrews contend with high temperatures, wind, turbulence, and visibility restrictions caused by smoke and terrain. Furthermore, in contrast to most commercial aviation, firefighting aircraft must provide their own safe separation. It is for these reasons that airspace coordination is of the utmost importance to safety. Though the Aerial Supervisor is responsible for overall control of aircraft on an incident, it is incumbent upon all aircrew personnel to participate in this endeavor by adhering to the rules set by policy and the instructions given by the Aerial Supervisor.

Operational Coordination and Control

The Aerial Supervisor is responsible for coordinating, assigning, and evaluating the use of aerial resources at an incident.

The Aerial Supervisor will:

- Discontinue flight operation anytime conditions appear unsafe.
- Advise inbound aircraft of known hazards such as obstacles, power lines, turbulence, visibility restrictions, and other air traffic on the incident, etc.
- Issue a clearance to each inbound aircraft prior to their arrival utilizing the standard Clearance to Enter script. Include specific routing when applicable.
- Establish traffic patterns and control procedures.
- Ensure that during airtanker drop runs, the frequency used to direct the drops remains clear throughout the base, final, and release. Communications during airtanker drops will be limited to transmissions between the dropping airtanker and the controlling Aerial Supervisor.
- Deconflict and approve all non-standard maneuvers as deemed necessary and as briefed to all other affected aircraft.

Pilots will advise the Aerial Supervisor:

- 12 nm from an incident, stating their distance, direction, and altitude.

  Note: Aircraft inbound to an incident will not proceed closer than 7 nm until Clearance to Enter is received from controlling Aerial Supervisor.
- Arrival on scene

  Note: Depending on fire size and complexity, “on scene” may include areas as far as 5 nm from incident center coordinates.
- When lifting off for helicopter missions
- When moving between operating and target areas
- When departing or re-entering an incident area
- When changing radio frequencies
- When encountering any unusual or unsafe situations
- Before performing a non-standard maneuver

Pilots are responsible for maintaining aircraft separation, radio contact, and adherence to correct flight patterns and altitudes.

Helicopter operations will be cleared and coordinated through the Aerial Supervisor. In absence of an Aerial Supervisor, helicopters will establish communication and a control procedure with airtankers to avoid possible conflicting flight paths.

Non-Standard Maneuver

A non-standard maneuver is an action by a pilot (and aircraft) performed in a way other than the standard method. Non-standard maneuvers are necessary at times when the standard method would be either unsafe or ineffective. It must be understood that a non-standard maneuver may require the suspension of other ongoing operations. Some examples of non-standard maneuvers are:

- A target identification pass (high show-me profile) by the ATGS aircraft
- An airtanker drop performed out of a right-hand pattern
- ATGS aircraft flying a left-hand orbit
- A helicopter flying a new or unassigned route within the incident boundary or above the helicopter ceiling altitude
- Any aircraft deviating from the assigned or expected altitude

Before a non-standard maneuver is executed:

- Non-standard maneuvers must be requested by the pilot intending to perform the maneuver.
- The controlling Aerial Supervisor must approve non-standard maneuvers.
- All pilots of aircraft that may be affected by the maneuver must acknowledge that they are aware of the maneuver about to take place.

Low-Level Operations (LPIL/ASM)

Low-level flight operations involve fixed-wing aircraft flying below 500 feet AGL. Low-level flight operations require a clearance. LPIL/ASM will request low-level clearance from ATGS if one is on scene. Low-level missions are performed by LPIL/ASM to increase airtanker drop effectiveness and safety. Aircraft and flight crews are specially trained and authorized for low-level missions. Situational awareness is the responsibility of each LPIL/ASM crew member to ensure safe flight operations. The LPIL/ASM conducts these operations in the following manner:

LPIL/ASM Tactical Flight Checklists

- High-level reconnaissance
  - A high recon pass is executed prior to descending to low-level.
  - Look for aircraft over the incident including media and non-participating aircraft.
  - Analyze the terrain. Identify potential approach and departure paths while identifying prominent target features. Fly the patterns at an altitude to detect hazards. Study the lay of the land to establish emergency exits.

  Note: The flight crew completes tactical checklist before conducting low-level flight.

- Low-level reconnaissance.
  - Obtain clearance from ATGS for low-level operations.
  - Check for turbulence, hazards to low-level flight, and low-level target identification features.
  - Fly the emergency exit paths to locate potential hazards not identified from a higher altitude.

Tactical Flight Profiles

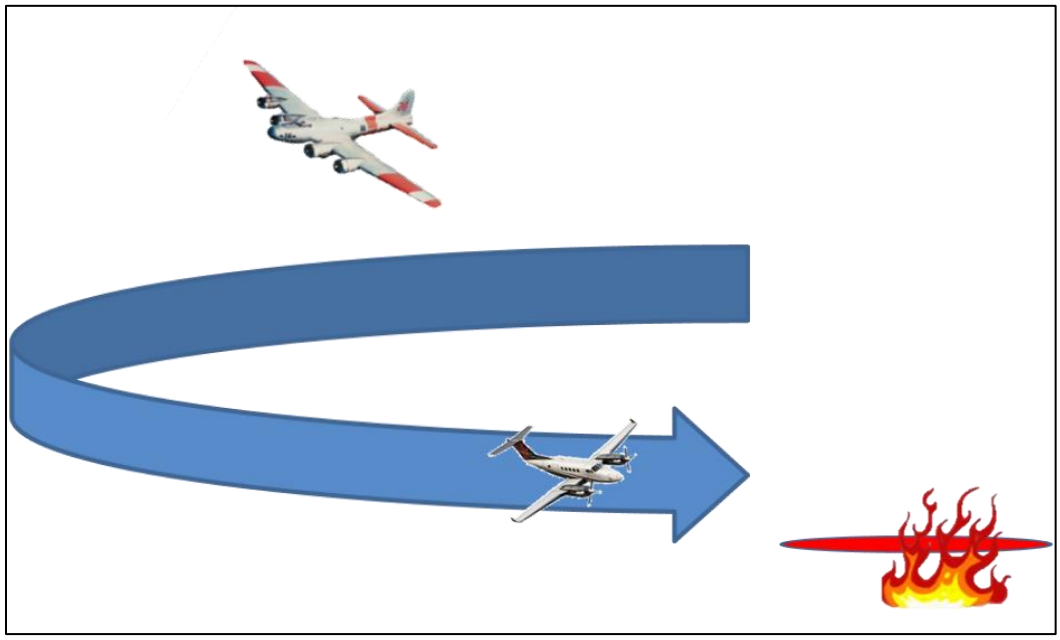
Show-Me Profile

A show-me profile is a low-level pass made over the target using the physical location of the aircraft to demonstrate the line and start point of the retardant drop.

The show-me profile is normally used for the first airtanker on a specific run or when an incoming airtanker has not had the opportunity to observe the previous drop. A show-me can be used alone or before other profiles.

The pilot begins the run when the airtanker crew can visually identify the aircraft, hazards, line, start, and exit point of the drop. The standard "show-me" is to fly the line you want the retardant on, not corrected for drift.

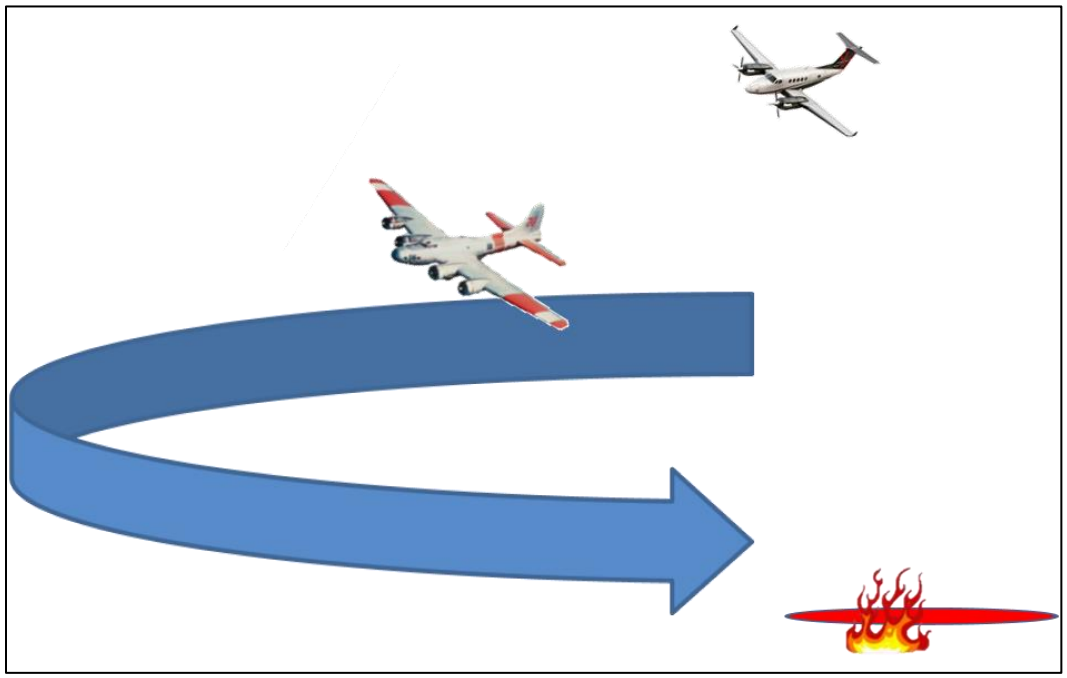
Figure 4. Show-Me Profile including blue arrow showing the flight path of a leadplane flying to a fire and retardant drop with an airtanker following the leadplane.



Chase Position Profile

The Chase Position Profile is an observation position in trail of, and above the airtanker, at a position of 5 to 7 o'clock. The Chase Position Profile is used to verbally confirm or adjust the position of the airtanker when on final, and to evaluate the drop. The figure below shows a blue arrow as the flight path of an airtanker flying to a fire and retardant drop with a leadplane following the airtanker.

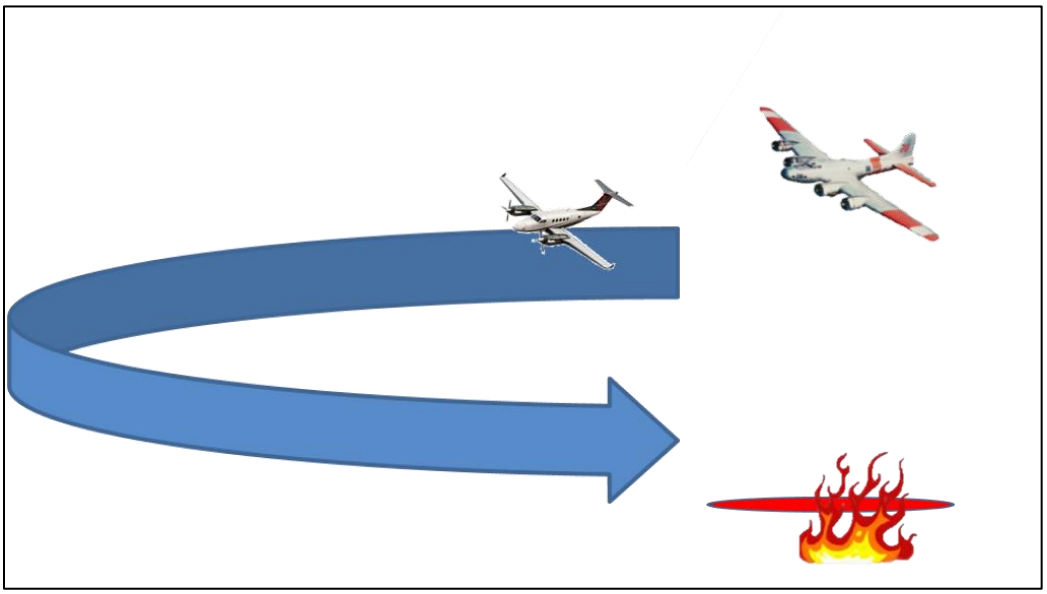
Figure 5. Chase Position Profile



Lead Profile

The lead profile is a low-level (below 500 feet AGL) airtanker drop pattern, made with the leadplane approximately one-quarter mile ahead of the airtanker. The lead profile is used at the request of the airtanker crew, or when the line or start point is difficult to see or to describe due to lack of visibility or references.

Figure 6. Lead Profile



Maneuvering

When leading airtankers, shallow to medium bank angles of 30 degrees should be used. When bank angles exceed 30 degrees, the LPIL shall notify and brief the airtanker. Bank angles will not exceed 45 degrees. Airspeed control is critical to a safe pattern. The shape, airspeed, and size of the pattern shall be well planned to minimize the airtanker pilot's maneuvering workload.

Minimum Airspeed

Airspeed during normal operations shall not be flown below minimum controllable airspeed one engine inoperative (Vmca).

Approach and Descent to the Target

The run should be downhill, down canyon, down sun with the greatest degree of safety in mind. Use the agreed upon airspeed to maintain approximately one-quarter-mile separation between the LPIL and airtanker. A descending approach with a constant rate of descent is desired, terrain permitting. Brief the airtanker pilot ahead of time if special maneuvering is anticipated. Advise the airtanker of hazards (i.e., turbulence, down air, restrictions to visibility, obstacles, etc.).

Final Approach to the Target

Power-up and clean up drag devices (when applicable) to cross the target area at the briefed airspeed. Do not accelerate too soon and run away from the airtanker. The standard “live run” is to fly the expected drift line.

Drop Height

- The minimum is 250 feet above the top of the vegetation for VLAT.
- The minimum is 150 feet above the top of the vegetation for LAT.
- The minimum is 60 feet above the top of the vegetation for SEAT.

It is important for the retardant to "rain" vertically with little or no forward movement. The airtanker pilot is responsible for maintaining safe drop heights.

Note: Generally, drop heights should be increased when using higher coverage levels.

Over the Target

Identify the start point with a verbal, "Here."

Exiting the Target

Comply with the briefed exit instructions. When possible, turn off the centerline of the run before initiating a climb (always be aware of the airtankers position). Exiting is a critical maneuver at low altitude. Take every precaution to ensure that airspeed and aircraft altitude are within safe limits. Safety-of-flight has priority over the drop evaluation.

Emergency Overrun Procedures

In the event of an imminent overrun of the LPIL by the airtanker, the airtanker crew will attempt to communicate the overrun and utilize the following standard overrun procedures unless otherwise briefed:

- Straight out flight paths: Pass the LPIL on the right.
- Left or right turn flight paths: Pass the LPIL outside the turn.
- Terrain or visibility limitations: When the previous two options are not available pass above the LPIL.

Airtanker Operations

Airtanker Advantages

- High cruise speed
- Long range

Reload Bases

Airtankers are loaded at either permanent or temporary retardant bases. When sending airtankers for load and return consider the following:

- Turnaround time
- Fuel available
- Retardant available
- Airtanker base approved for specific aircraft

Factors Influencing Drop Effectiveness

Several factors affect drop accuracy. These factors include:

Pilot Skill

Ability to make accurate, timely, and effective drops.

Aircraft make and model – Each aircraft make and model has advantages and disadvantages in different operating environments. Elements include power, maneuverability, pilot's visibility, and airspeed control.

Tanking, Gating, or Door System

Quantity of liquid, tank configuration, flow rate, and door release mechanism.

Airtanker Drop Height

Increased height reduces coverage level and increases line width. The most uniform and efficient retardant distribution is attained when near vertical fall of the retardant occurs. The optimum drop height is when the momentum of the load stops its forward trajectory and begins to fall vertically.

Airtanker Speed

Airtanker drop speeds are variable depending on type of aircraft and environmental conditions. Faster speeds generally reduce peak coverage levels and increase pattern momentum.

Visibility

Smoke, sun angle, shadows, etc.

Terrain

Drainage, steepness, etc.

Wind

The effect of wind is to deflect retardant and greatly increase the pattern's fringe area. The effectiveness of retardant/waterdrops should be closely evaluated in high winds.

- Headwind: The effect of dropping into the wind is to shorten the line length and increase coverage level.
- Crosswind drops will result in increased line width and cover a larger area at reduced coverage levels.
- Thunderstorms and downdrafts/updrafts.

Flame Lengths

Direct attack with retardants at the prescribed coverage level is generally effective in flame lengths up to 4 feet. Flame lengths from 4 to 8 feet require increasingly higher coverage levels. Retardant, unless applied in heavy coverage levels and greater widths, is not generally effective when flame lengths are greater than 8 feet. Retardant is most effective when applied to available fuels outside of the fire perimeter.

Canopy Density

Drops in timber or fuel models with a dense concentration of tall trees are often ineffective. Canopy interception significantly reduces penetration to ground fuels. An open canopy allows for better penetration.

Availability of Ground Forces

Except in light fuels where extinguishing the fire with retardant may be possible, the ATGS must determine if ground forces will be able to take advantage of the retardant within a reasonable time.

Retardant Coverage Levels

Coverage level refers to the number of gallons of retardant applied on fuels per 100 square feet. Fire scientists have determined how many gallons per 100 square feet (GPC) it takes to effectively retard flammability in fuel models under normal flame lengths. Coverage levels range from 0.1 to greater than 8.0. The ATGS instructs airtanker pilots to make drops at specific coverage levels.

Recommended Coverage Levels

The chart below identifies the recommended coverage level for each fuel model. The coverage level may need to be increased under more adverse burning conditions or when retardant does not effectively penetrate a heavy tree canopy.

Table 8. Recommended Retardant Coverage Levels

Coverage Level	NFDRS Fuel Model	NFFL FB Fuel Model	Fuel Model Description
1	A,L,S	1	Annual Perennial Western Grasses, Tundra
2	C H,R	2 8	Conifer with Grass, Short needle Closed Conifer, Summer Hardwood
	E,P,U	9	Long needle Conifer, Fall Hardwood
	T	2	Sagebrush with Grass
3	N	3	Sawgrass
	F	5	Intermediate Brush (green)
	K	11	Light Slash
4	G	10	Short needle Conifer (heavy dead litter)
	O	4	Southern Rough
6	F,Q	6	Intermediate Brush (cured), Black Spruce
	B,O	4	California Mixed Chaparral; High Pocosin
Greater Than 6	J	12	Medium Slash
	I	13	Heavy Slash

Airtanker Flight Routes

For route safety, the approaches and exits must allow for a level or downhill flight maneuver.

Airtanker Drop Patterns

The ATGS must know the various drop pattern options and the coverage level required for various fuel models.

Salvo Drop

Generally used on small targets such as spot fires or targets requiring heavy coverage levels.

Trail Drop

With multiple tank systems, two or more doors are open sequentially and at specified intervals giving continuous overlapping flow over a desired distance at the required coverage level. The same result is obtained with constant flow systems by opening the doors partially.

Heavy Airtanker Line Length Production

This chart displays line production by coverage level and gallons dropped for drops made at the recommended drop height and airspeed.

Table 9. Airtanker Line Length Production Cart (feet)

Volume Dropped (Gallons)	Coverage Level 1	Coverage Level 2	Coverage Level 3	Coverage Level 4	Coverage Level 6	Coverage Level 8
800	1,114	526	311	189	38	0
1,000	1,202	607	384	255	90	0
1,200	1,289	687	458	321	142	9
1,400	1,377	768	531	387	194	46
1,600	1,465	848	604	454	245	84
1,800	1,552	929	678	520	297	121
2,000	1,640	1,009	751	586	349	158
2,200	1,728	1,090	824	652	400	196
2,400	1,815	1,170	897	718	452	233
2,600	1,903	1,251	971	784	504	270
2,800	1,991	1,331	1,044	850	556	308
3,000	2,078	1,411	1,117	916	607	345

Ten Principles of Retardant Application

- Determine the strategy— direct, parallel, or indirect, based on fire size-up and resources available.
- Establish an anchor point and work from it.
- Use the proper drop height.
- Apply proper coverage levels.
- Drop downhill and down sun, when feasible.
- Drop into the wind for best accuracy.
- Maintain honest evaluation and effective communication between the ground and air.

- Use direct attack when ground support is available, or it is feasible to extinguish the fire.
- Plan drops so that they can be extended or intersected effectively.
- Monitor effectiveness of retardant and adjust use accordingly.

Water Scooping Operational Principles

Water scooping aircraft are valuable resources in the support of wildland fire suppression and management. The current models include the following:

Table 10. Water Scooping Aircraft Capabilities

Type	Max Capacity (gal)	Cruise (kt)	Power (hp)
Single-Engine Scooper	800	140	1600
CL215T	1,300	180	4760
CL415	1,600	180	4760

Many scooping aircraft are capable of injecting gel or foam into the scooped load. The air attack must determine if water enhancers are authorized for use on the incident as some agencies and contracts do not approve of their use. Some of the aircraft are equipped with infrared imagery systems that may provide a more precise drop.

Aerial supervisors need to understand the capabilities and limitations of these aircraft. Factors such as invasive species, cross-contamination, scoop site length requirements, distance from scoop site to drop, terrain, visibility, wind direction, and load pickup limitations will be considered when deciding if they are an appropriate resource for the mission. The PIC of each scooping aircraft will have the final determination regarding scoop site and drop feasibility.

Water scooping aircraft will be treated the same as standard land-based airtankers for purposes of the FTA. After the drop-scoop pattern is established and only when safety for all aircraft allows, it may be more efficient to clear scooping aircraft into the FTA at an altitude 500 feet above their drop altitude.

Additional References Related to Water Scooping Aircraft

- *NWCG Standards for Water Scooping Operations*, PMS 518, https://www.nwcg.gov/publications/pms518
- USFS Standards for Water Scooping Operations: https://www.fs.usda.gov/managing-land/fire/aviation/publications
- *Guide to Preventing Aquatic Invasive Species Transport by Wildland Fire Operations*, PMS 4444, https://www.nwcg.gov/publications/pms444

SEAT Operational Principles

For additional information see *NWCG Standards for Airtanker Operations,* PMS 514, https://www.nwcg.gov/publications/pms514.

- Minimum SEAT drop height is 60 feet above vegetation.
- When collocated with aerial supervision, use both resources for IA.
- SEATs are most effective on small, emerging incidents.
- Reduce turnaround times by setting up portable retardant base(s) as close as possible to the incident.
- Efficiency is maximized when time spent over the target is minimized. LPILs typically utilize the show-me and chase profiles.
- Integrate SEATs with other resources – Use SEATs in conjunction with helicopters and large airtankers. SEATs may be used in flights.
- Use retardant or suppressants with SEATs – Foam and gels work well for direct attack.
- SEAT pilots are trained to apply the ASHE acronym for safe operations:
  - Approach
  - Speed and Height
  - Horizontal Separation
  - Exit

Flights of Single-Engine Airtankers and Scooping Aircraft

Flights of aircraft are comprised of two or more SEATs or scoopers of the same make and model in close proximity to one another operating with a common objective.

There must be enough distance between aircraft to allow aerial supervision to convey updated directions to the airtanker considering the preceding drop or a change in objectives.

The trailing aircraft are responsible for separation between their aircraft and the aircraft they are following.

The lead aircraft in the flight will be primarily responsible for communications. During the initial transmission to the FTA, the lead aircraft will identify themselves with their scooper number (or tanker number for flight of SEATs) followed by the phrase “flight of” and then the total number of aircraft in the flight (for example, 209 flight of three, with 211, and 212, twelve miles west”). Aerial supervision will then communicate FTA clearance to the flight lead. The flight lead should confirm the clearance, and each trailing aircraft will acknowledge the clearance by transmitting their call sign and respective order in the flight (for example, “212 number 2”). This protocol ensures all aircraft understand the clearance and serves as a radio confirmation for all aircraft in the flight.

Further communications will be given to the flight lead unless specific instructions need to be given to other aircraft. If the same directions are given to each aircraft in the flight, such as tag and extend from the existing target, each aircraft in the flight will acknowledge by transmitting their call sign in the flight as appropriate. If directions are unclear to any aircraft in the flight, the pilot shall seek clarification prior to the drop.

Any change in flight status shall be communicated to aerial supervision utilizing call signs.

Flights of Single-Engine Airtankers or Single-Engine Scoopers

- SEATs will be given clearance in the configuration (individual or as an established flight) in which they check into the FTA.
- Flights of individual SEATs will not be created within the FTA.
- Aerial supervisors may request individual SEATs from flights outside the FTA.
- Flights will be limited to four SEATs or single-engine scoopers.

Helicopter Operations

Helicopter Advantages

Helicopters are often a very cost-effective resource on extended attack and project incidents because of the following:

- Short turnaround times
- A Type 1 helicopter with a 3-minute turnaround can deliver upwards of 45,000 gallons per hour (Boeing 234, S-64). By comparison, a Type 1 airtanker will typically deliver 2,000 to 3,000 gallons per hour based on a one-hour turnaround.
- Low-speed and accurate drops.
- The ability to do hover or low-speed drops makes helicopters very accurate. Helicopters are an excellent choice for targets in confined airspaces or steep and exposed terrain.
  Caution: Drops on steep slopes may dislodge rocks onto crews below.

Dip Sites

For an effective helicopter operation, good water sources are required. Sources can include wide-mouth portable tanks. The ATGS should inventory suitable dip sites.
Following are considerations:

- Approaches should be into the wind. Determine if wind direction is the same at hover level as it is at the dip site level when using a longline.
- Helicopters equipped with a tank and snorkel require water depth of 18 inches to 3 feet for hover filling.
- Be aware of any local resource concerns and fire management plan restrictions. Ask the local fire managers or dispatch for specifics.
- Approach, departure, and dip site must be free of hazards.
- Avoid fast-moving streams and rivers.
- Avoid contamination of water resources from buckets or snorkels that have previously been used in foam or retardant dip sites or any other resource contamination concerns (whirling disease).
- On private lands, attempt to secure permission from the landowner before using a private water source. This may be addressed in a pre-attack plan. Anticipate the need and secure permission before the need arises.
- Utilize dip site managers (when available) to provide an added margin of safety at established dip sites.

Longline Bucket Operations

- Effective for dipping out of confined sources (e.g. dip site surrounded by tall timber).
- Reduced rotor wash on the fire.
- Effective for filling portable tanks.

Establish Direct Communications Between Helicopters and Ground Contacts

If air-to-ground is too congested, request an additional air-to-ground frequency.

Allow Pilots to Select Drop Approach

- Cross-slope, usually most preferred.
- Downslope, second choice.
- Upslope or downwind, least desirable approach.

Helicopter Utilization by Type

- Helicopters of all types can work together if all pilots involved are comfortable with the pattern and separation.
- Type 1 and 2 helicopters can be effective for line production.
- Use Type 3 helicopters on isolated targets requiring lower volumes of water.

Helicopter Drop Height

Critical in terms of accuracy, effectiveness, and effect of rotor wash on fire behavior. Look for flare-ups after drops.

Helicopter Delivery Systems

Some systems can regulate flow rate and are capable of multiple or partial drops.

Buckets

Three basic types of buckets are:

- Rigid shell buckets – Some capable of multiple drops
- Collapsible buckets (and foldable) – Some capable of single drop only
- Power fill buckets – Capable of multiple drops

Fixed Tanks

Different operators and agencies have developed a variety of tank systems. Most can be quickly attached to the fuselage. The tanks are generally filled using a snorkel while the helicopter is hovering over a water source. The tank can also be filled on the ground using standard cam-lock hardware. Minimum water depth requirements for the snorkel fill-system are 18 inches to 3 feet. Example: S-64 Sky Crane with a 2,500-gallon tank, hover fills from 18 inches in 45 seconds and provides prescribed coverage level from metered flow door system.

Helicopters

Height is critical in terms of accuracy, effectiveness, and effect of rotor wash on fire behavior. Helicopters must be high enough to not cause flare-ups. Forward air speed results in less rotor wash. Type 1 helicopters, even with a 200-foot longline, produce strong rotor wash.

Note: Caution when mixing multiple helicopters with dissimilar delivery systems (i.e., belly hooked bucket, longline, and tanked aircraft). Different airspeed, maneuverability, flight profile, and pilot site picture have potential to impact aircraft separation. To increase safety and efficiency of the operation, the Aerial Supervisor may request longline bucket operations be belly hooked.

Helicopter Drop Patterns

In a hover, a helicopter can deliver a salvo drop, while in forward flight it can deliver a trail drop.

Night Helicopter Operations

See Night Helicopter Operations Plan.

Smokejumper Operations

Smokejumper aircraft are dispatched with a standard load of 8 to 12 smokejumpers and equipment to be self-sufficient for 48 hours. A qualified smokejumper spotter (senior smokejumper in charge of smokejumper missions) may coordinate with on-scene aircraft over a fire until a qualified ATGS arrives. See the *Interagency Smokejumper Operations Guide* (ISMOG) for further information at https://www.fs.usda.gov/sites/default/files/media_wysiwyg/ismog_fss_final_26feb2018signed.pdf.

Approach to the Fire

Smokejumper aircraft normally approach the fire at 1,500 feet AGL (streamer drop altitude for both the BLM and Forest Service).

Drop Mission

The drop mission is a four-part operation:

1. Jump Spot Selection

   Selecting a safe jump spot sometimes requires the smokejumper airplane to make a low-level pass at approximately 500 feet AGL to identify potential hazards. Letting the smokejumper aircraft orbit above other tactical aircraft to view the fire area if the lower airspace is being utilized can save time. Jumpers can also be deployed a short distance from the fire to conduct simultaneous tactical operations.

2. Streamer Runs

   The smokejumper aircraft will usually initiate a left-hand pattern over the selected jump spot at a minimum of 1,500 feet AGL (measured from the jumper release point). One to three streamer passes are conducted to verify the wind direction and speed.

3. Jump Runs

   Round or ram-air parachute systems may be used. Jump runs may be conducted at 1,500 feet AGL for jumpers on round canopies, or at 3,000 feet AGL for those on ram-air parachutes. Loads may be mixed. When dropping mixed loads, the standard practice is to drop round parachutes first then request clearance to climb to deploy the ram-air jumpers. Smokejumpers are deployed in one to four person sticks depending on the size of the spot, wind, and the aircraft.

4. Cargo Runs

   After the jumpers are verified safely on the ground, the airplane descends to drop the paracargo. Cargo run patterns are similar in altitude to retardant drops, 150 to 200 feet above the drop point. The number of passes depends on the number of jumpers deployed, size of spot, and equipment needed. The spotter will notify the ATGS or LPIL of the number of passes anticipated and when the mission is completed.

Considerations

Priorities vary in deploying resources on incidents, but it is advisable to get the firefighters on the ground as soon as possible. Unless extenuating circumstances dictate otherwise, let the smokejumper airplane come in and perform the entire 4-part operation. If it is necessary to break into the mission to deploy other tactical aircraft, interrupt the smokejumper operation between the jump spot selection and streamer run, or between the last jump run and first paracargo run. Keep in mind that the jumpers need their tools to be effective.

When other priorities and congested airspace are an issue, consider deploying the jumpers preferably using non-conflicting flight patterns or when this is not practical, a short distance from the fire.

Helicopter Rappel Operations

The DOI's National Park Service has Type 2 and Type 3 helicopters used for rappelling. Type 3 helicopters carry up to two rappellers and a spotter while Type 2 helicopters carry up to four rappellers and a spotter.

Arrival

Rappel helicopters approach the incident at 200 to 500 feet AGL or the altitude assigned by the Aerial Supervisor. Upon arrival at the incident site, they will survey the area to determine the best method to deploy the firefighters. The helicopter may or may not arrive configured to rappel. Normally, the helicopter is dispatched configured to rappel unless they know that a rappel is not necessary from intelligence provided by personnel at the site.

If not configured for the rappel, the helicopter will survey the rappel location and then fly to a landing site within a few miles of the incident to reconfigure for the rappel. It takes 5 to 10 minutes to reconfigure.

Suitable Landing Site

Providing there is a suitable landing site close to the incident and the terrain, and vegetation between the landing site and the incident will not inordinately delay the firefighters walking to the incident, this alternative will be used versus rappelling.

Rappel Operation

If no landing site is available, the firefighters will rappel into the incident. The helicopter will approach the selected rappel site and perform a high hover power check (above 300 feet AGL). Once this is completed, they will descend to a stationary hover position at 250 feet AGL or lower (depending on the height of the vegetation) and perform the rappel operation. Once all the rappellers are on the ground, and their ropes released from the helicopter, the spotter deploys the cargo (cargo is sometimes deployed before the rappellers).

Note: Density altitude may require the helicopter to make multiple trips to deploy partial loads. The spotter will communicate this if it is a factor.

Communications

The pilot and spotter will always monitor the Air Guard frequency and the assigned tactical frequency except on occasion when deploying personnel and cargo. When the tactical frequency is very active, the rappel helicopter may request not to monitor this frequency because a sterile cockpit is essential during the actual rappel phase. Do not communicate with the helicopter during this phase unless there is an emergency.

Considerations

The rappel helicopter has limited fuel duration over the incident. It is helpful to survey the area prior to the arrival of the rappel helicopter to point out potential landing sites or to relay that there are no landing sites near the incident. If delays are anticipated or required, consider directing the helicopter to land nearby to conserve fuel. Keep in mind that it is important to get the firefighters and their tools on the incident.

Water Scooper Operations

Scooping Site Requirements

The water source should be free of obstruction and suitable to the PIC. The scooping path does not have to be straight, as the aircraft is somewhat maneuverable while scooping. Factors such as wind, elevation, and surrounding terrain will have a bearing on water source suitability. Less than a full load can be scooped on slightly smaller lakes.

Refer to agency-specific information for additional requirements.

Consistency and Water Temperature

The consistency or aeration of the foam is affected by water temperature. A slightly higher concentration may be needed for cold water and adjustments downward may be necessary for extremely warm water.

Evaluating Consistency

Foam consistency is best evaluated by ground personnel. Drops can be evaluated from the air using visibility criteria. Wet foam is visible for about 5 minutes, dripping foam for about 15 minutes, and dry foam is visible for 30 or more minutes.

Environmental Limitations

- Foam is not recommended within 300 feet of lakes and streams.
- In steep drainages or sensitive areas, check local agency policy on foam use.

- When scooping during foam operations, some residual foam may flush out of the vent/overflow. While very diluted, some foam may be visible on the water for a short time.
- Obtain a briefing from the IC or responsible agency on the limitations of foam use, if any, prior to using.

Rinsing Tanks

Provide for two rinse loads of water before departing to a fire.

USFS: Per the contract, water scoopers shall not be loaded with chemical retardant, water enhancers, or foam.

Tactical Considerations

Tank Configuration

The CL-215 has two compartments totaling 1,400 gallons, and the CL-415 has four compartments totaling 1,600 gallons and single-engine scooper has one compartment up to 800 gallons. Loads can be dropped salvo, in trail, or split into separate drops.

Drop Height

Drop height ranges from 60 feet to 150 feet, depending on factors such as foam versus straight water, as well as the direction of run (into wind versus downwind).

Flight Patterns and Turnaround Times

Standard Flight Pattern

The standard flight pattern is an oval racetrack, with a scoop into the wind and a downwind drop on the fire.

Scooping Operation

During the scooping operation, including approach, and departure from the lake, communications with the airtanker should cease to allow the crew to concentrate on the pickup. The airtanker will call when "up" or "off" the water, which will signify to the ATGS that it's okay to transmit.

Traffic over the scoop area can be a source of conflict. Identifying approach and departure routes may become important.

Chapter 9 – All Hazard Incidents

Fire incidents have long utilized aerial supervision for coordinating aerial resources. The same principles of supervising and directing aircraft can be applied to other types of incidents commonly referred to as "all hazard incidents." All hazard incidents include volcanic eruptions, earthquakes, search, and rescue operations, floods, oil spills, hurricanes, and spray projects.

Non-Wildfire Incident Aerial Supervision

On non-fire incidents when the level or complexity of air operations exceeds the supervisory capability of the ATGS/ASM, the organization may be expanded to include a HLCO. The HLCO position reports to the ATGS/ASM. The roles and responsibilities are basically the same as fire incidents.

- Large or complex incidents, which have a mix of fire and other disaster operations (earthquake or volcanic eruption), require both an ATGS/ASM and a HLCO to coordinate and integrate the mix of aviation assets.

Criteria for Assigning Aerial Supervision

Without adequate supervision and coordination air operations will very likely be less efficient, more costly, and less safe. An ATGS/ASM should be assigned when an incident meets the criteria listed below.

- Multiple aircraft operating in incident area airspace
    - Mix of fixed-wing and helicopter operations
    - Mix of low-level tactical/logistical aircraft
    - Periods of marginal weather, poor visibility, or turbulence
- Two or more branches using air support
- Mix of both civil and military aircraft operating in the same airspace or operations area
- When conditions require airspace management, ATC, and air resource mission priority setting and coordination
- Ground stations have limited ability to communicate with flying aircraft due to terrain or long distances

Aerial Supervision Interaction and Communication

Although all hazard incidents retain the basic ICS organization and roles, there are incident specific technical specialist positions added to the ICS organization to supervise, coordinate, and lead specific incident functions. Aerial supervisor roles may be modified to fit the incident situation, and they may be coordinating directly with people other than the traditional OSC, Division/Group Supervisor, or Strike Team/Task Force Leader. It is critical that we understand the roles and responsibilities of the Technical Specialist positions, how they are identified, and how our role interacts with them (chain of command, communications protocol, authority, etc.).

Use of Military Aircraft

It is important to fully understand the military organization(s), their SOPs, military aircraft capabilities and limitations, and how the ICS interfaces with military operations. An assigned agency Aviation Military Liaison (civilian) and Military Air Operations Coordinator (civilian) will work with the AOBD and Aerial Supervisor in assigning and coordinating military air operations.

The availability of military air tactical resources may vary dramatically due to global defense strategies. Refer to the Military Use Handbook for additional information and guidance.

Chapter 10 – Safety

Safety is the principal consideration in all aspects of aerial supervision. A safe aviation operation depends on accurate risk assessment and informed decision-making.

Risk levels are established by the severity of possible events and the probability that they will occur. Assessing risk identifies the hazard, the associated risk, and places the hazard in a relationship to the mission. A decision to conduct a mission requires weighing the risk against the benefit of the mission and deciding whether the risks are acceptable.

Examples of the Risk Management Process are available in the *IRPG*, the *Interagency Standards for Fire and Fire Aviation Operations* (Red Book), CAL FIRE 8300, and the *NWCG Standards for Helicopter Operations*, PMS 510, https://www.nwcg.gov/publications/pms510.

Factors to Consider During the Risk Assessment Process

- Any flight mission has a degree of risk that varies from 0 percent (no flight activity is conducted) to 100 percent (aircraft and/or personnel experience a mishap).
- The Aerial Supervisor must identify hazards, analyze the degree of risk associated with each, and place hazards in perspective relative to the mission or task.
- Hazards might not always be limited to the performance of flight but may include hazards to personnel if the flight is not performed.
- The risk assessment may include the Aerial Supervisor, AOBD, Duty Officers, agency fire management staff, ICs, dispatchers, and Line Officers/managers.
- Ultimately, the PIC has the authority to decline a flight mission that they consider excessively hazardous.

USFS: All Forest Service flights require a risk assessment. Refer to USFS Manual 5700 and USFS Handbook 5709.16.

Mitigating Risks

In some cases, the Aerial Supervisor may have to shut down air operations. Air operations must not proceed until risk mitigation measures are implemented. Risk mitigation measures to consider:

Modifying Air Operations

There is no way to define an exact trigger point for adjusting, downsizing, or completely suspending aviation operations. The factors listed below should be evaluated to determine whether additional aerial supervision resources are needed, or tactical/logistical missions need to be modified/suspended:

- Complexity of aviation operations
- Communications
- Topography (fire size, position on slope, location, etc.)
- Firefighter and public safety
- Poor visibility
- Wind
- Turbulence

- Fire behavior
- Aircraft incident/accident
- Aircraft/aircrew performance

Monitor the Overall Aviation Operation for Human Factors Related Issues

- Task saturation
- Fatigue, burnout, and stress
- Normalization of risk
- Lack of situational awareness
- Mental and physical health

Monitor Effectiveness of the Overall Air Operation

- Ensure suppression objectives are truly obtainable.
    - Risk versus reward – Is the mission worth it?
    - Is there adequate ground support?
    - Are there adequate aerial resources?
- Is there enough time in the operational period?
- Monitor weather conditions for increasing winds, turbulence, thunderstorms, or decreasing visibility.
- Be proactive in communicating current fire and fire weather conditions.
- Provide realistic input regarding resource needs commensurate with successful completion/modification of incident objectives.

Use the Appropriate Aircraft for the Mission

- Turbine versus piston engine
- Pressurized versus unpressurized
- VLATs, LATs, and/or SEATs
- Consider density altitude
- Helicopter types and delivery systems
- Single-engine service ceiling

Communications Planning

When discrete radio frequencies are used during incident operations, ensure contact frequencies such as command and air-to-ground are monitored by appropriate ground personnel. Make sure that ground personnel know how to reach the Aerial Supervisor.

Order Additional Frequencies

Order additional frequencies as needed for operations. As incident complexities increase, the Aerial Supervisor must ensure adequate radio frequency coverage. Be proactive; there can be up to a 24-hour delay from the time a frequency is ordered to the time it is assigned to the incident.

Establish Positive Airspace Management

Hold aircraft in the air or on the ground until structured traffic patterns can be established.

Span of Control

Limit number of aircraft working an incident based on visibility, routing procedures, and communications capabilities.

Obtain Input

Discuss operations safety with LPIL, HLCO, and mission pilots. Mission debriefings are an excellent source of information; Air crewmembers and support personnel will utilize an AAR to critique mission effectiveness.

System Safety Assessment

The effectiveness of risk assessment and management can be increased through use of the current System Safety Assessment for Aerial Supervision Operations.

The following assessment of aerial supervision operations has been developed for aerial supervisors. It identifies hazards, the likelihood of encountering them and the risk associated with exposure to the hazard. Mitigations are listed for each hazard as well as the post mitigation risk.

System Safety Utilization is a standard operating procedure and covers all aspects of aerial supervision. It should be used for incident operations, training, and review by agency air crewmembers.

Table 11. System Safety Assessment for Aerial Supervision

System – Aircraft

Subsystems	Hazards	Pre-Mitigation Likelihood	Pre-Mitigation Severity	Pre-Mitigation Outcome	Mitigation	Post Mitigation Likelihood	Post Mitigation Severity	Post Mitigation Outcome
	Avionics failure.	Occasional	Marginal	Medium	Minimum Equipment List establishes minimum requirement. Mission requirements as determined by the flight crew. Integrate into Preflight Checklist.	Improbable	Negligible	Low
Avionics	Avionics package insufficient for mission complexity.	Probable	Critical	High	Contract specifications that recognize mission requirements. Ensure necessary type, configuration, and number of radios to complete mission safely. Reduce span of control. Limit operations.	Remote	Marginal	Medium
	Contract pilot unfamiliar with avionics. (Cannot run radios or GPS, etc.).	Occasional	Marginal	Medium	Release, replace the pilot, and enforce contract specifications.	Remote	Negligible	Low
Aircraft Type	Reduced field of view for the flight crew.	Occasional	Critical	Serious	Ensure aircraft is appropriate for the mission. Flight profile altered to maximize visibility. Use of TCAS. Clear communication with other aircraft. Alter interior configuration (headrest, seat, windows).	Improbable	Negligible	Low

1 System – Aircraft (continued)

Subsystems	Hazards	Pre-Mitigation Likelihood	Pre-Mitigation Severity	Pre-Mitigation Outcome	Mitigation	Post Mitigation Likelihood	Post Mitigation Severity	Post Mitigation Outcome
Performance Standards	Poor engine performance (single/twin, turbine/recip) for the ATGS mission.	Occasional	Catastrophic	High	Plan for high-density altitudes. Download cargo/fuel load. Relocate to favorable location. Alter the mission. Upgrade the aircraft. Ensure aircraft is appropriate for the mission. Perform preflight planning.	Remote	Catastrophic	Serious
Contracting	Contract pilot skill/fire experience leading to substandard performance (i.e., working avionics, flight skills) during flight operations.	Remote	Critical	Medium	Thorough briefing. Ride along with veteran fire pilot. Use contract evaluation process. Contractor training. Computer-based training. Give air attack pilots a check ride every 3 years.	Improbable	Critical	Medium
Fuel	Capacity and procedure, ground-fueling errors.	Frequent	Catastrophic	High	Verify adequate volume of fuel for mission. Ensure proper fueling procedures are followed for type of aircraft.	Remote	Critical	Medium

1 **System– Flight Operations**

Subsystems	Hazards	Pre-Mitigation Likelihood	Pre-Mitigation Severity	Pre-Mitigation Outcome	Mitigation	Post Mitigation Likelihood	Post Mitigation Severity	Post Mitigation Outcome
Mission	Restricted visibility.	Frequent	Catastrophic	High	Limit exposure. Determine effectiveness of the operation (risk vs. benefit) and discontinue if warranted. Limit number of aircraft in operating area. Increase vertical/horizontal separation of aircraft.	Occasional	Critical	Serious
	Wake turbulence.	Occasional	Critical	Serious	Situational awareness assists prevention. Communication helps to avoid wake turbulence areas. Wake turbulence avoidance procedures (altitude, time, distance).	Remote	Critical	Medium
	Weather (Turbulence/wind/T-storms).	Frequent	Critical	High	Adjust tactics or shut down air operations. Increase vertical/horizontal separation of aircraft. Utilize human aided technology (weather radar, etc.). Encourage dispatch to obtain/communicate weather information. Utilize and share pilot reports of severe weather.	Occasional	Critical	Serious
	Poor fuel management.	Occasional	Critical	Serious	Monitor fuel quantities. Follow fuel transfer procedures.	Remote	Critical	Medium
	Controlled flight into terrain due to low-level operations.	Frequent	Catastrophic	High	Ensure high-level recon is completed before commencing low-level flight. Manage radio communication. Proper aircraft configuration. Reduce exposure time in low level. Consult sectional chart/hazard map and ground personnel/other aircraft (AC). Obtain unit in-brief. Utilize local knowledge.	Remote	Catastrophic	Serious
	Operating in close proximity to other aircraft (collision potential).	Frequent	Catastrophic	High	Ensure communication is established with all aircraft. Use situational awareness. Use of TCAS. Establish clear and concise directions for simultaneous operations, (virtual fence, geographic separation, altitude separation, holding/timing). Establish IPs, ingress/egress route.	Remote	Catastrophic	Serious

1 System– Flight Operations (continued)

Subsystems	Hazards	Pre-Mitigation Likelihood	Pre-Mitigation Severity	Pre-Mitigation Outcome	Mitigation	Post-Mitigation Likelihood	Post-Mitigation Severity	Post-Mitigation Outcome
Mission	Reliance on technology causes distraction, low situational awareness, division of attention in the cockpit.	Frequent	Catastrophic	High	Maintain situation awareness. Maintain see and avoid techniques Prioritize mission/cockpit workload. Utilize CRM practices.	Remote	Catastrophic	Serious
	Aircraft emergency (engine out, fire, bird strike, mechanical failure, etc.).	Occasional	Catastrophic	High	Crew cross training and familiarization with a/c systems and emergency procedure checklists (pinch hitter/simulator training).	Remote	Catastrophic	Serious
	Exceeded span of control.	Occasional	Critical	Serious	Ensure roles and responsibilities are assigned and understood within aerial supervision crew. Assign aircraft to common functions and tasks with a single point of contact. Hold aircraft at base to limit the number of assigned aircraft over the incident.	Remote	Critical	Medium
	Unclear objectives/tactics.	Frequent	Critical	High	Ensure strategy and tactics are clear and understood. Use common terminology, solicit/utilize feedback.	Occasional	Critical	Serious
	ATGS performance results in hazardous operation.	Occasional	Critical	Serious	Shut down the operation, deconflict the area. Return to base to debrief the mission. Coach, proficiency check ride, retrain/recertify.	Remote	Critical	Medium
	Unnecessary exposure due to inefficient operational use of tactical aircraft.	Probable	Critical	High	Use SOPs for all tactical aircraft types. Use the right tool for the job. Training, feedback, brief/debrief.	Remote	Critical	Medium
	Aircraft operating without aerial supervision.	Frequent	Critical	High	When aerial supervision is readily available (within the dispatch area/GACC), they will be ordered for the safety, effectiveness, and efficiency of ground and/or aerial firefighting operations.	Occasional	Critical	Serious

1 System– Flight Operations (continued)

Subsystems	Hazards	Pre-Mitigation Likelihood	Pre-Mitigation Severity	Pre-Mitigation Outcome	Mitigation	Post Mitigation Likelihood	Post Mitigation Severity	Post Mitigation Outcome
Airspace	FTA: Aircraft not complying with procedures.	Probable	Catastrophic	High	Aerial supervision enforces FTA procedures.	Improbable	Critical	Medium
	Multiple IA incidents in same area cause confusion; near miss hazard.	Probable	Critical	High	Coordinate with dispatch and other aircraft. Ensure fire names, frequencies, locations, and aircraft assignments are communicated to all flight crews.	Occasional	Critical	Serious
	Special use airspace: Aircraft not having authorization to enter the SUA, not coordinating with controlling agency.	Probable	Critical	High	See and avoid. Know SUA areas. Establish communication with controlling agency. Conduct thorough briefings.	Remote	Critical	Medium
	Non-incident aircraft intrusion in TFR.	Probable	Catastrophic	High	See and avoid, inform other aircraft on scene. Re-evaluate TFR promotion.	Remote	Catastrophic	Serious
	Fires in proximity to airport/airstrip. Potential for midair collision or intrusion in FTA.	Occasional	Catastrophic	High	Implement/validate TFR as incident expands, deconflict SUA, establish communication with controlling agency, notify other aircraft. Provide TFR transition corridors for non-incident aircraft on large incidents. Increase awareness of General Aviation (GA) operators and other agency flight crews not assigned to incident.	Remote	Catastrophic	Serious
Communication	Radio frequency congestion.	Frequent	Critical	High	Exercise radio discipline/order additional frequencies as needed.	Remote	Critical	Medium
	State/County/Rural resources on different bandwidth.	Probable	Critical	High	Coordinate with cooperators to find a way to communicate with one another.	Remote	Critical	Medium
	Hazardous air operations resulting from inaccurate information disseminated through the dispatch system.	Frequent	Critical	High	Verify information at time of dispatch. Flight crews will brief/debrief with dispatchers. Provide aviation training for dispatchers. Maintain qualified dispatcher on the A/C desk.	Occasional	Critical	Serious

Chapter 11 – Job Aids and Resources

Required Job Aids (LPIL/ASM)

A full contiguous U.S. approach and IFR chart coverage or approved Electronic Flight Bag that is FAA and agency approved.

Aerial Supervision Kit

Each aerial supervisor should have and maintain a kit. The following items are recommended to be on board the aircraft:

- Knee board – Leg board/clipboard
- Headset, flight helmet, PPE
- Frequency guide
- Batteries
- Flashlight
- Camera
- Overnight bag

Consider electronic tablets with charging cables and external power supply, which contain the following items:

- Maps
    - Current FAA sectional chart coverage area
    - Agency maps
    - Local hazard map (from Airtanker Base Manager or Dispatch)
    - Incident map (updated daily)
- Air Tactical forms – at https://www.nwcg.gov/publications/pms505.
    - Fire size-up.
    - Mission Checklist
    - ATGS/LPIL/ASM evaluation
    - Initial Attack/Extended Attack ATGS form
    - SEAT Pilot Mission Documentation Log
    - Aerial Supervision Transition Checklist
    - LPIL, ASM, or ATGS Mission Log
    - Airtanker Briefing Checklist
    - Aerial Supervision Cost Summary
    - Pilot Flight time and Duty Day Tracking
    - Scripts
    - SAS

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While they may still contain current or useful information, previous editions are obsolete. The user of this information is responsible for confirming that they have the most up-to-date version. NWCG is the sole source for the publication.

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Comments, questions, and recommendations shall be submitted to the appropriate agency program manager assigned to the IASS. View the complete roster at https://www.nwcg.gov/committee/interagency-aerial-supervision-subcommittee.