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National Wildfire Coordinating Group

Interagency Aerial Supervision Guide

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This product is available electronically at: http://www.nwcg.gov. Printed copies may be ordered from the Great Basin Cache, National Interagency Fire Center, Boise, ID. For ordering procedures and costs, please refer to the annual NFES Catalog Part 2: Publications posted at http://www.nwcg.gov/publications/449-2.

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Table of Contents

Figures

Tables

Chapter 1 – Introduction

Goal

To promote safe, effective, and efficient aerial supervision services in support of incident goals and objectives.

Objectives

- Standardize interagency aerial supervision operations and procedures.
- Standardize the roles, responsibilities, and scope of each aerial supervision position.
- Standardize program and training management goals to achieve standardized interagency operational and training objectives.
- Standardize all elements of the interagency aerial supervision community; Air Tactical Group Supervisors (ATGS), Aerial Supervision Modules (ASM), Leadplane Pilots (Lead), Airtanker Coordinators (ATCO), Air Tactical Pilots (ATP), Air Tactical Supervisors (ATS), and Helicopter Coordinators (HLCO).
- Provide a standard operational procedural interagency guide, which can be utilized by all members of the aerial supervision community.

Scope

This *Interagency Aerial Supervision Guide* standardizes federal agencies, state agencies and local agencies in the accomplishment of the numerous aerial supervision roles as defined by the Incident Command System (ICS).

Authority

The Interagency Aerial Supervision Subcommittee (IASS) is responsible for the update and completion of this guide with oversight provided by the National Interagency Aviation Committee (NIAC). The National Wildfire Coordinating Group (NWCG) provides the authority to develop this guide.

Publication Mechanism

The *Interagency Aerial Supervision Guide*, PMS 505, is available digitally from the NWCG Web site at http://www.nwcg.gov/publications and printed copies are available through the cache system. The *Interagency Aerial Supervision Log Book*, PMS 509, is only available electronically from the NWCG Web site.

Review and Revision Schedule

IASS will review and publish the *Interagency Aerial Supervision Guide* on a 3-year cycle, with a change option annually. The *Aerial Supervision Logbook* will be reviewed and published on a 3-year cycle.

Change Proposal Process

Change recommendations shall be submitted to the appropriate agency program manager assigned membership to the IASS. The following link provides the Revision Request Proposal form: http://www.nwcg.gov/publications/505

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Chapter 2 – Aerial Supervision Administration, Roles, and Responsibilities

Program Administration

Agencies are responsible for oversight and management of their agency's aerial supervision program. In order 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, CAL FIRE, and Military Agency Program Managers

These managers are delegated by their respective agencies and are responsible to administer the agencies aerial supervision program. Interagency scope of responsibilities should include:

- Coordinate with other agency program managers, the Interagency Aerial Supervision Subcommittee (IASS), 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, instructors, and Final Evaluators.
- Ensure agency training and currency requirements are met. Annually review mission and qualification summaries.
- Participate on interagency working groups, committees, and subcommittees such as the Interagency Helicopter Operations Program Subcommittee (IHOPS), the Interagency Single Engine Airtanker Board Subcommittee (SEATB), and the Interagency Airspace Subcommittee (IASC).
- Coordinate training at the National and/or Geographic level.
- Manage instructor and final evaluator designations/qualifications in order to meet agency quality assurance, standardization, and training objectives.
- Track, coordinate, and supervise trainee progression.
- Ensure coaches are assigned to trainees.
- Provide for 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 Interagency Aerial Supervision Guide (IASG) and interagency training management system.
- Additional roles and responsibilities may be assigned based on agency specific needs.

GACC Aerial Supervision Representatives (GACC REPS)

Aerial Supervision Specialists, assigned by the Geographic Area Coordination Group, coordinate geographic aerial supervision needs and provide quality assurance oversight of interagency operational and training performance standards.

GACC REPS

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

Scope of Duties

- Serve as a Geographic Area interagency aerial supervision point of contact.
- Coordinate with agency program managers and Geographic Area Training Reps (GATR) to coordinate interagency quality assurance observation flights, final evaluation flights, and training of participating federal, state, and local agencies.
- Make recommendations concerning training priorities to agency program managers and GATR's.
- May assist the GACC aircraft coordinators with tactical aerial supervision information and recommendations.
- Coordinate with agency program managers to ensure concurrent and cohesive training, training curriculum, and operations standards are met, nationally.
- Provide input to the revision of the Interagency Aerial Supervision Guide and interagency training management system.
- Participate at the National Aerial Supervision meeting (held annually).

Aerial Supervision Working Groups

Sub-groups of the Interagency Aerial Supervision Subcommittee (IASS) provide subject matter expertise within the group's area of expertise. The purpose is to provide program and technical assistance and meet IASS assigned tasking. Each group is managed under a charter from IASS.

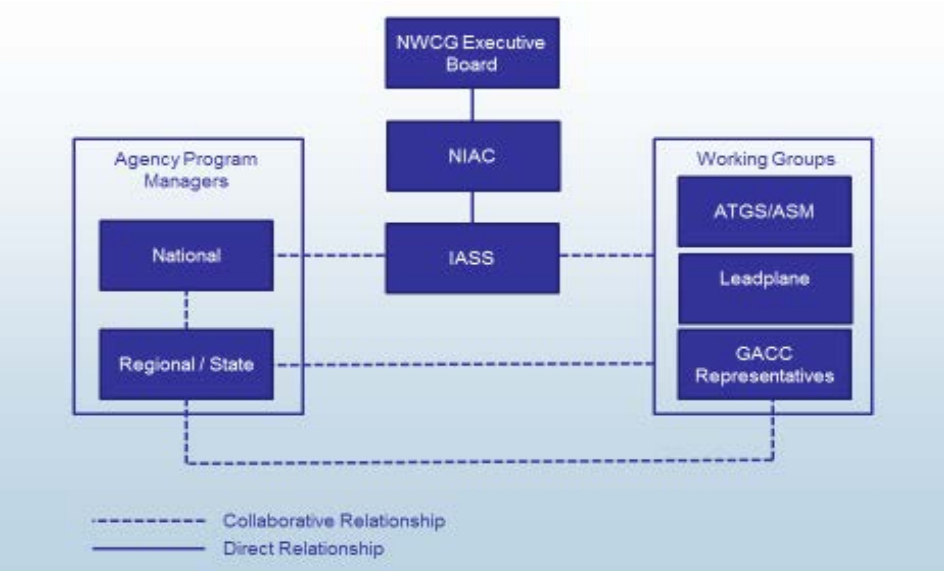
Chair/Co-chair:

- Serve as the point of contact to the IASS and manage the working group.
- Serve as the Subject Matter Expert (SME) during IASS meetings and deliberations.

Working Group Members:

- GACC Representatives.
- Agency Representatives – National, regional, and state SME's.
  - Agency program managers.

Figure 1. Interagency Aerial Supervision Relationship Diagram



Aerial Supervision Resources

There are five types of aerial supervision resources and six aerial supervisor classifications. Although these positions are unique, they share the common purpose of facilitating safe, effective, and efficient air operations in support of incident objectives.

Helicopter Coordinator (HLCO)

The HLCO coordinates, directs, and evaluates tactical/logistical helicopter operations. The HLCO position is typically activated on complex incidents where several helicopters are assigned. A HLCO can increase the span of control of the ATGS by managing helicopters over an incident. The HLCO may provide sole aerial supervision on an incident where only helicopters are assigned, otherwise ATGS is required. 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, AOBD, or designee.

Other than the prerequisite requirements for ATGS, HLCO organizational structure, currency, and refresher requirements are recommended to mirror the ATGS program.

The HLCO is qualified to function from either an airplane or helicopter.

Air Tactical Group Supervisor (ATGS)

The ATGS coordinates incident airspace and manages incident air traffic. The ATGS is an airborne firefighter who coordinates, assigns, and evaluates the use of aerial resources in support of incident objectives. The ATGS is the link between ground personnel and incident aircraft. The ATGS 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. The ATGS must 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 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/groups while maintaining communications with operations personnel and aircraft bases (fixed/rotor).

In the Incident Command System (ICS), the ATGS works for the IC on initial attack and the Operations Section Chief (OSC), Air Operations Branch Director (AOBD), or operational designee on extended attack. The ATGS supervises the ATCO, Leadplane Pilot, and the HLCO positions when activated. The ATGS is qualified to function as an ATCO or HLCO from either an airplane or helicopter.

Airtanker Coordinator (ATCO)

The ATCO coordinates, directs, and evaluates airtanker operations. The ATCO works under the ATGS. This position is typically activated on complex incidents where several airtankers are assigned. An ATCO can reduce the span of control of the ATGS by managing all the airtankers over an incident. If no ATGS is present, the ATCO works for the IC. **The ATCO may not be authorized for low level (below 500' Above Ground Level [AGL]) operations.**

Leadplane Pilot

The Leadplane position is identical to the ATCO except the pilot is qualified and authorized for low level operations. A Leadplane Pilot is not recognized in ICS and is classified as an ATCO by default. The low level capabilities of a Leadplane enhance the safety and effectiveness of airtanker operations in the often turbulent, smoky, and congested fire environment.

Aerial Supervision Module (ASM)

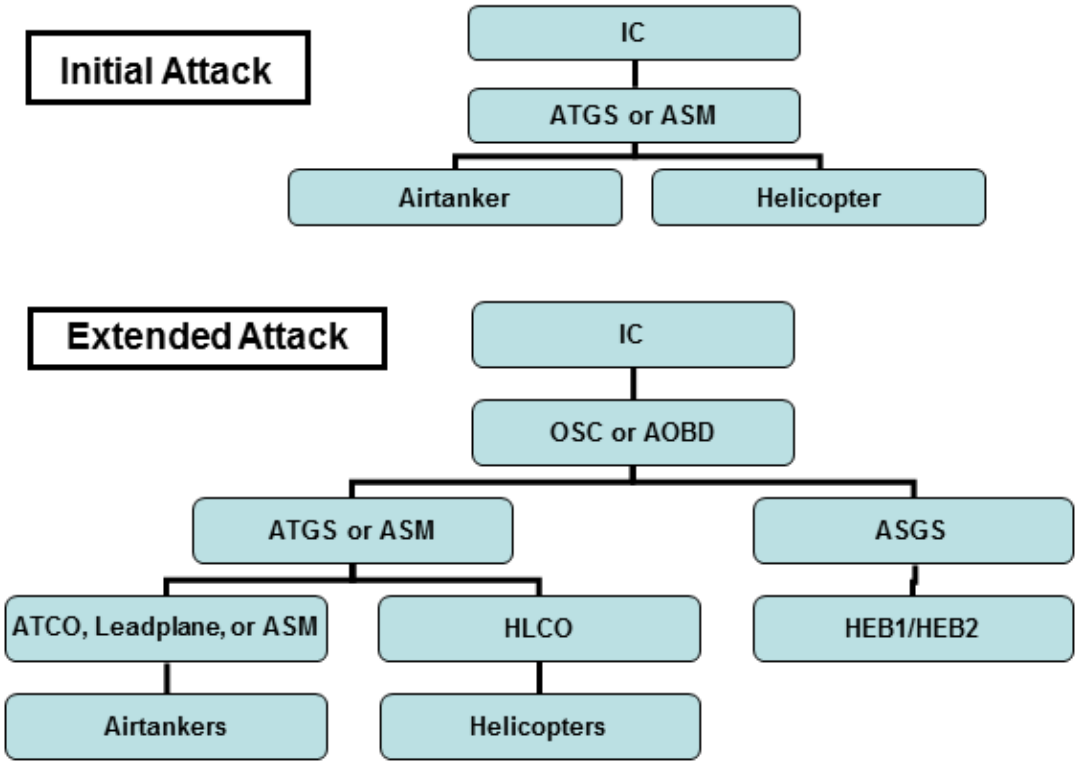
An ASM is a two person crew functioning as the Lead and ATGS from the same aircraft. The ASM crew is qualified in their respective positions and has received additional training and authorization. An ASM can be utilized as a Lead, ATGS, or both, depending on the needs of incident management personnel. An ASM consists of an Air Tactical Pilot and Air Tactical Supervisor.

Air Tactical Pilot (ATP) – The ATP is a qualified Leadplane Pilot who has received specialized training and authorization to function as an ASM crewmember. The ATP functions as the Leadplane pilot and utilizes Crew Resource Management (CRM) skills to evaluate and share the incident workload with the ATS.

Air Tactical Supervisor (ATS) – The ATS is a qualified ATGS who has received specialized training and authorization to function as an ASM crewmember. The ATS is an ATGS who also utilizes CRM to evaluate and share the incident workload with the ATP.

The following charts depict the relation of Aerial Supervision to other resources in ICS

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



Chapter 3 – 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 and/or standard is to achieve the highest level of safety and performance.

Helicopter Coordinator (HLCO)

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

HLCO Position Duties

- A qualified HLCO or ATGS will oversee on-the-job training (OJT) during all missions.
- Only qualified HLCO's can recommend certification of a HLCO.
- Coordinates, directs, and evaluates tactical/logistical helicopter operations.
- Provide sole aerial supervision on an incident where only helicopters are assigned, otherwise ATGS is required.

HLCO Initial Training

- S-378 or equivalent

HLCO Certification

- Completion of Position Task Book (OJT)

HLCO Supplemental Training

- Attend RT-378 triennially
- 7 Skills CRM training
- S-271 Helicopter Crew Member
- S-372 Helicopter Manager
- Load Calculations

HLCO Currency

- 1 mission every 3 years

Air Tactical Group Supervisor (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

- Safely and effectively utilize aircraft to support incident management objectives.
- Coordinate incident airspace and manages incident air traffic.
- Coordinate, assigns, and evaluates the use of aerial resources in support of incident objectives.
- 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.

- 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 or exceed prerequisite experience requirements and mandatory training requirements listed in the PMS 310-1 or Forest Service Fire and Aviation Qualification Guide.

ATGS Classroom Training

- S-378, Aerial Supervision, National Aerial Supervision Academy (Alternate Delivery S-378) or CAL FIRE C-378.

ATGS Agency Approved CRM Training

- Federal and federally sponsored Administratively Determined (AD) employees will complete the 7 Skills CRM training (3 hour minimum) 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.

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

ATGS Candidate Evaluations

- The candidate shall receive a written evaluation at the completion of all missions from the ATGS Evaluator as an integral part of the mission de-briefing. Multiple missions may be combined.
- The Aerial Supervision Mission Evaluation 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 task book.

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, fuel types and incident complexities. Training opportunities may include the following:

- Assignments to work with full-time, dedicated/exclusive use ATGS at an air attack base.
- Assignments to a national or geographic area Incident Management Team (IMT).
- Details or training assignments in other geographic areas to increase the depth of experience
- Participate as a passenger on other tactical aircraft during tactical missions (subject to

approval from the National Program Manager, Contracting Officer, Contractor and Pilot in Command).

ATGS Certification Process

Upon completion of the task book, the agency final evaluator will:

- Perform a final mission evaluation.
- Return the completed task book to the ATGS trainee along with recommendations.
- Notify the appropriate agency program manager.
- Trainee is responsible for submitting completed position task book, training documentation, and final recommendation to certifying official.

ATGS Supplemental Training

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

- Pinch Hitter pilot course.
- Private pilot ground school.
- National Aerial Fire Fighting Academy (NAFA & NAFA II).
- Participation in aerial reconnaissance or aerial detection missions.
- Observing or participating in large helibase operations.
- Orientation to airtanker base and retardant operations.
- Orientation to or observation of aircraft dispatch operations.
- Assignments to work with full-time, dedicated, or exclusive use ATGS at an air attack base.
- Peer-to-peer observation and cross training is recommended to enhance skills, provide a venue to observe other qualified ATGS's, and enhance operational standardization.
- Assignments to a national or geographic area IMT.

ATGS Currency Requirements

All ATGS will meet the requirements stated in the PMS 310-1and forward an annual mission summary[1] to the appropriate agency program manager/Regional Aviation Manager (RAO). In addition:

- Annually perform, document, and report a minimum of five missions. (Failure to maintain ATGS 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 (see glossary).
- Attend a triennial RT-378.
- Attend a triennial agency approved 7 skills CRM refresher.
- Recertification-See 310-1 or agency specific policy.

[1] Annual Mission Summaries, Individual Mission forms, and Mission Evaluation forms are components of the Aerial Supervision Log Book (NFES 1150).

United States Forest Service (USFS) qualified ATGS's must meet the Forest Service Fire and Aviation Qualifications Guide and the PMS 310-1 for ATGS currency.
California Department of Forestry **(CALFIRE) supports the above currency requirements and manages them internally.**

ATGS Refresher Training (RT-378)

Required elements

- Proficiency exercise
- Risk management/ System Safety
- Mission procedures
- FTA management
- Fire and Aviation Weather
- Lessons Learned/Case Studies
- Agency approved CRM refresher
  - Federal and federally sponsored AD employees will complete the 7 Skills CRM refresher (1.5 hours minimum) facilitated by a federally authorized instructor.
  - State employees will follow state CRM training requirements.

Optional Elements

- Radio programming
- Map reading and navigation
- Strategy and tactics
- Aviation incidents/accidents from the preceding season
- Payment documents
- Contract and aircraft fleet updates
- Issues and concerns from national and/or regional user groups (fire management, dispatch, hotshots, incident commanders, etc.)
- Communications brevity
- Electronic Flight Bags

Proficiency Exercise

All ATGS will demonstrate proficiency in the required refresher elements and complete a moderate complexity (a mix of at least four fixed and rotor wing aircraft) mission or flight/Sand Table Exercises (STEX) exercise (appendix B). Students will be evaluated utilizing the Aerial Supervision Mission Evaluation form (PMS 509)

The exercise will represent a typical Initial Attack (IA) and will require the ATGS to demonstrate the minimum acceptable skill set of the position including Fire Traffic Area (FTA) entry, determining FTA altitudes, initial aircraft briefings, aircraft separation, communication with air and ground resources, and situational awareness.

Performance will be documented on a Mission Evaluation, reviewed with the participant, and forward a copy to the appropriate Agency Program Manager. Failure to demonstrate an acceptable level of proficiency will require the ATGS 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 or simulated mission utilizing the Aerial Supervision Mission Evaluation form. ATGS (Evaluator/Final Evaluator) conducts 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/deficiently:

- The event will be discussed with the individual, and documented.
- Depending on the agency, the documentation will be forwarded to the appropriate RAO/agency program manager, and the individual's supervisor or sponsoring agency/official. The individual may be made unavailable for ATGS assignments in the appropriate dispatch/status system.

Air Tactical Group Supervisor Coach

ATGS Coaches serve as a point of contact and subject matter expert for the trainee throughout the training process.

Position Requirements

- Qualified ATGS

Responsibilities

- Help develop a training plan for the candidate.
- Coordinate with the Agency Program Manager and Employee Supervisor.
- Assure training is on track and that all requirements are being scheduled so as to not delay 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.

Air Tactical Group Supervisor Evaluator

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

Position Requirements

- 1 Year following ATGS qualification while maintaining currency.
- Attend and document a regionally sponsored ATGS evaluator workshop triennially (by 2019).
- Administratively Determined (AD) are authorized for this position providing they meet the position requirements.
- Maintain ATGS currency.
- The agency program manager/ appropriate RAO will track ATGS Evaluator. ***State Agency aviation program managers have the ability to designate state employed ATGS Evaluators.***

Responsibilities

- Utilize applicable methods to promote ATGS trainee progress and ultimate certification.
- Utilize training aids, best practices, forms, and policy documents to maximize the training experience.
- Review and complete applicable position task book elements.
- Document strengths, area for improvement, and focus areas utilizing the Aerial Supervision Mission Evaluation Form (PMS 509 Form 4) located at: http://www.nwcg.gov/products/509/aerial-supervision-logbook-forms.
- Provide feedback to the trainee's supervisor/coach..
- Share progress reports with ATGS Evaluator community.
- Coordinate with trainee's supervisor to recommend and schedule final evaluation flight).

Air Tactical Group Supervisor 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 (one year)

Workshop Instructor Requirement

ATGS Evaluator

Course Prerequisite

None

Course Level

Regional, state, or area

Course Content:

- Instructional methods
- Utilization of the Mission Evaluation Form (PMS 509 form 4) located at: http://www.nwcg.gov/products/509/aerial-supervision-logbook-forms .
- Mission flights
- Lecture
- STEX
- After Action Review (AAR)
- Interagency/Regional consistency
- Cockpit Resource Management (CRM)/Human Factors – How to provide constructive criticism
- Training Aids
- Policy

Air Tactical Group Supervisor 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 Final Evaluator verification page in the ATGS position task book.

Position Requirements

- 1 Year of experience as an ATGS Evaluator.
- Attend and document a nationally sponsored ATGS Final Evaluator Workshop triennially (by 2019).
- Administratively Determined (AD) employees are NOT authorized to perform this function.
- Maintain ATGS currency.
- The appropriate RAO /agency program manager will provide a letter of authorization to the ATGS Final Evaluator upon completion of the requisite training.
  State Agency aviation program managers have the ability to 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 Aerial Supervision Mission Evaluation form.
- Complete the Position Task Book (PTB).
- Complete Final Evaluator Verification OR,
- Complete an Evaluation Record (experience block) to document further training recommendations.
- Review evaluation with ATGS Trainee.
- Contact Trainees supervisor and review the final evaluation.

Air Tactical Group Supervisor 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 (PMS 509)
- CRM/Human Factors – How to provide constructive criticism
- Agency specific qualification/certification processes

Airtanker Coordinator (ATCO)

The ATCO may not be authorized for low level (below 500' Above Ground Level (AGL) operations.

Position Duties

- Coordinates, directs, and evaluates airtanker operations.
- Works under the ATGS.

Leadplane Pilot

The primary mission of the Leadplane Pilot is to ensure the safe, efficient and effective use of airtankers in the management of wildland fire. The term "Leadplane Pilot" is used to address a specialized function. The Incident Command System (ICS) does not include this position in the organization but uses the term Airtanker Coordinator (ATCO). The differences between the functions of the two positions are addressed below.

Leadplane operations place a high demand on not only pilot skills, but on a person's management skills. Pilot skills, mission management, and application of fire behavior knowledge, all correlate with successful mission performance.

A Leadplane Pilot is an aerial firefighter. As such, NWCG firefighter training titles are used in lieu of standard Federal Aviation Administration (FAA) pilot terminology. For purposes of Leadplane Pilot 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 Leadplane pilot call sign/qualification list is maintained by the USFS Washington Office (WO), Branch Chief Pilot Standardization and published annually in the National Mobilization Guide.

Leadplane Pilot Qualifications

Candidates for Leadplane pilot designation must be federal or State (or state contract) employees who have the appropriate FAA pilot and medical certifications. Forest Service candidates shall possess, as a minimum, the flight experience listed in the Forest Service Handbook (FSH) 5709.16. Department of The Interior (DOI) pilots shall meet, as 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.

Deviations or Exceptions

The WO Branch Chief, Pilot Standardization in coordination with the appropriate RAO (USFS), the National Flight Operations Manager (BLM), or appropriate State 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 carried in the trainees training folder.

Leadplane Pilot Initial Training Curriculum

Every effort shall be made to limit the number of Leadplane Pilot Evaluators assigned to provide training for each candidate during Phases 1 and 2.

Leadplane Pilot Training

This defines the Leadplane pilot program of instruction.

- Organizational Course of Instruction
- I-200 Basic Incident Command System (ICS)
- S-370 Intermediate Aviation Operations, if available. If not available, S-270 Basic Aviation Operations
- S-290 Intermediate Fire Behavior
- National Air Attack Academy (Alternate delivery S-378) or CALFIRE Air Attack Academy
- Interagency Aerial Supervision Academy (Initial Leadplane Pilot Training Course)
- **Note:** The above courses shall be completed **prior to** entering Phase 3 Operational Flight Training

Leadplane Pilot Supplemental Training

Candidates should obtain additional training beyond agency minimum requirements prior to proceeding with Operational Training.

- Wildland fire suppression experience
- Low-level and mountain flying experience
- Fire suppression tactics
- Dispatch Center orientation and operations
- Helicopter Operations

Additional courses to be completed at the next available opportunity after initial qualification:

- National Aerial Firefighting Academy (NAFA) or NAFA II
- Agency approved 7 Skills Crew Resource Management

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 prior to the candidate's progress to the next phase.

Documentation of Training

The pilot is responsible for maintaining their individual training folder. The folder shall include the following:

- Course completion certificates
- Record of ground and flight training including documentation of corrected deficiencies
- Sign-offs for each Phase of Flight Training

Flight Training Records

Leadplane Pilot Evaluators will provide the trainee with a 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 forwarded to the WO Branch Chief, Pilot Standardization (USFS), the National Flight Operations Manager (BLM), or the appropriate State Aviation Officer. The Leadplane Evaluator will retain a copy for their records.

Leadplane Training / Check Form

- The Leadplane / Check Form is to be used to record all Leadplane training and checkrides.

Initial Leadplane Pilot Training Process

The Initial Leadplane Pilot Training Course should be taken before entering Phase 1 but shall be accomplished before completing Phase 2.

Note: The Leadplane Evaluator may alternate between the left and right (front and back) seats during Phases 2 and 3.

Phase 1

- Minimum of two operational periods of observing and assisting an ATGS on missions.
- Minimum of two missions of Leadplane Tactical Flight Training comprised of low level flight, mountainous terrain flight, proximity flight, and Leadplane/airtanker simulation. **Note:** Flight time obtained in the Initial Leadplane Pilot Training Course can be used to meet this requirement.
- **Phase Check** –This check will evaluate the following in a non-fire environment.
  - **Oral –** The trainee shall pass an oral review covering all activities under Phase 1. 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 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 (Appendix A).
  - **Flight Check –** The flight check shall include low level mountain flying, airspeed control, tactical low level patterns and join ups.

Phase 2

- Minimum of 3 missions observing in the right seat fire missions with a Leadplane Evaluator.
- Ride as an observer on a variety of airtankers, during fire missions.
- Minimum of 15 Leadplane missions on fires of various size and complexity as the flying pilot in the left seat under the supervision of a Leadplane Evaluator.
- **Phase Check –** A Leadplane Final Evaluator will administer the Phase Check.
  - **Oral –** 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 Leadplane mission.
  - **Flight Check –** The flight check to determine that the trainee (1) can safely perform the Leadplane 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.

- Minimum of ten Leadplane missions on fires of varying size and complexities as the flying pilot under the supervision of a Leadplane Evaluator.
- A portion of the Leadplane missions shall be flown in other Regions/States if not accomplished in Phase 2.
- Additional flights in airtankers as necessary.

- **Final Leadplane Progress Check –** A Leadplane Pilot Evaluator will make a final progress check upon completion of the Phase 3. This will consist of an oral review covering all aspects of Leadplane pilot 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 than schedule a final check ride.

Final Evaluation and Qualification

To be designated as a Leadplane pilot, candidates shall have:

- Satisfactorily completed all operational flight training and acquire the necessary operational flight experience.
- Undergone a complete oral and operational evaluation. The evaluation consists of:
  - A Phase 3 sign-off by a Leadplane Evaluator who has instructed the candidate during Phase 3, attesting to the candidate's mission competence.
  - A final flight check (which may require multiple missions to allow the Leadplane Final Evaluator to observe adequate performance in complex environments) by a Leadplane Final Evaluator certifying that the candidate has completed the required training and recommends they be approved to perform as a Leadplane pilot.
- The WO Branch Chief, Pilot Standardization in coordination with the appropriate RAO (USFS), the National Flight Operations Manager (BLM), or appropriate State Aviation Official will issue a letter of designation upon successful completion of Leadplane training.

Leadplane Pilot Currency

Experience – Leadplane pilots shall complete 30 Leadplane missions in a three-year period. Pilots not meeting the 30-mission requirement shall pass a flight check on a Leadplane 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.

Annual Leadplane Refresher

A Leadplane refresher will occur annually and consist of ground school and flight training.

Required Ground School Refresher Elements

- Target Description Exercise
- Safety
- Communications
- Tactics
- Airtanker operations

Optional Ground School Refresher Elements

- Incident Command System
- Pre-season Update: (Airtanker crew assignments, Expected fire behavior, Long-term weather prognosis)
- 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

- Leadplane Tactical Flight Profile
- Communications
- Escape Routes
- Emergency Procedures
- Annual Leadplane pilot mission competency check by a Leadplane Evaluator

Standardization Evaluation

Leadplane mission checks may be conducted at any time for all qualified Leadplane pilots with not prior notice. The results will be forwarded to the appropriate RAO and WO Branch Chief, Pilot Standardization (USFS), the National Flight Operations Manager (BLM), or appropriate State Aviation official and the Leadplane pilot briefed on the evaluation.

Air Tactical Pilot/ASM Training

See ASM section.

Modular Airborne Fire Fighting System (MAFFS)

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

Qualifications

- Be a qualified Leadplane pilot.
- Shall have completed MAFFS Leadplane Pilot training.

Certification

- Attend MAFFS Training Session.
- Interim certification may be granted upon initial Leadplane qualification based on actual MAFFS operational experience obtained during initial Leadplane training. Leadplane pilots who obtain interim MAFFS certification shall attend the next MAFFS Training Session.

Currency

Leadplane pilots shall attend the MAFFS Training Session every four years at a minimum.

Region 5 South Ops Familiarization

Leadplane pilots shall receive instruction by an experienced Leadplane Evaluator in South Ops before operating alone in that area. The WO Branch Chief, Pilot Standardization in coordination with the appropriate RAO (USFS), the National Flight Operations Manager (BLM), or appropriate State Aviation Official may waive this requirement if the Leadplane Pilot received instruction in this area on fire missions during Phase II or Phase III Leadplane training.

Supplemental (AD) Leadplane Pilots

AD pilots shall maintain the same currency and training requirements stipulated for agency pilots. The USFS WO will publish a list of supplemental Leadplane pilots on an annual basis.

Leadplane Pilot Coach

This section describes the qualifications, training, and currency requirements necessary to perform as a Leadplane Coach. Leadplane Coach: Serves as a point of contact and subject

matter expert for the trainee throughout the training process.

Position Requirements

- Qualified Leadplane Pilot

Responsibilities

- Help develop a training plan for the candidate.
- Coordinate with the appropriate RAO/Agency Program Manager and Employee Supervisor.
- Assure training is on track and that all requirements are being scheduled so as to not delay 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.

Leadplane Pilot Evaluator

Leadplane Pilot Evaluator provides consistent Leadplane instruction, evaluation, and feedback on Leadplane missions**.**

Qualification Requirements

- Current Leadplane pilot with a minimum of two seasons experience after initial qualification.
- Multi-Region experience as a qualified Leadplane Pilot.
- MAFFS Qualified.
- Possess the appropriate FAA flight instructor certificate.
- Region 5 South Ops Experience.
- Attend Leadplane Evaluator workshop biennially.

Responsibilities

- Utilize applicable methods to promote Leadplane trainee progress and ultimate certification.
- Utilize training aids, best practices, forms, and policy documents to maximize the training experience.
- Review and complete applicable phase training documentation.
- Document strengths, area for improvement, and focus areas utilizing the Leadplane Pilot Training/ Check Form.
- Provide feedback to the trainee's supervisor/coach.
- Share progress reports with Leadplane Evaluator community.
- Coordinate with trainee's supervisor to recommend and schedule final evaluation flight.

Certification Process

- Pass a Leadplane Pilot Final Evaluator oral and flight check.
- The WO Branch Chief, Pilot Standardization in coordination with the appropriate RAO (USFS), the National Flight Operations Manager (BLM), or appropriate State Aviation Official will issue a Leadplane pilot evaluator designation letter.

Currency

- Maintain Leadplane pilot currency
- Maintain MAFFS currency
- Attend biennial Evaluator Workshop

Leadplane Pilot Evaluator Workshop

Objective

- Prepare Leadplane Evaluators to apply current and consistent training procedures.
- Target Group: Qualified Leadplane Pilots with 2 years of experience.
- Workshop Instructor Requirement –Leadplane Pilot Evaluators and Final Evaluators.

Nomination Process

The leadplane working group, in conjunction with the WO Branch Chief, Pilot Standardization and the appropriate RAO (USFS), the National Flight Operations Manager (BLM), or appropriate State Aviation Official will nominate pilots who meet the qualifications and whom they consider to have the experience, aptitude, dedication, and ability to perform the duties of a Leadplane Pilot Evaluator.

Course Prerequisite

- Multi-Region experience as a qualified Leadplane Pilot
- MAFFS Qualified
- Possess the appropriate FAA flight instructor certificate
- Region 5 South Ops Experience

Course Level

National Interagency

Course Content

- Instructional methods
- Utilization of the Leadplane Pilot Training/ Check Form
- Mission flights
- Lecture
- STEX
- AAR
- Standardization of instruction
- CRM/Human Factors – How to provide constructive criticism
- Training Aids
  - Policy

Leadplane Pilot Final Evaluator

Leadplane Pilot Final Evaluator provides final Leadplane Pilot trainee evaluations. The Leadplane Pilot Final Evaluator makes the recommendation for certification to the appropriate Agency Program Manager.

Qualification Requirements

- Current Leadplane pilot with a minimum of three seasons as a Leadplane Evaluator.
- MAFFS Qualified.
- Possess the appropriate FAA flight instructor certificate.
- Attend Leadplane Final Evaluator workshop biennially.

Responsibilities

- Coordinate with Leadplane Evaluator and trainee's supervisor to schedule and implement a final evaluation/check ride.

- Perform final evaluation/check ride and complete Leadplane Pilot Training/ Check Form.
- Contact Trainees supervisor and review the final evaluation.

Certification

- Pass a Leadplane Pilot Final Evaluator oral and flight check.
- The WO Branch Chief, Pilot Standardization in coordination with the appropriate RAO (USFS), the National Flight Operations Manager (BLM), or appropriate State Aviation Official will issue a Leadplane pilot final evaluator designation letter.

Currency

- Maintain Leadplane pilot currency
- Maintain MAFFS currency
- Attend biennial Final Evaluator Workshop

Leadplane Pilot Final Evaluator Workshop

Objective

Prepare Leadplane Final Evaluators to apply current and consistent training procedures.

Target Group

Qualified Leadplane Evaluator Pilots with 3 years of experience

Workshop Instructor Requirement

Leadplane Pilot Final Evaluator

Nomination Process

The leadplane working group, in conjunction with the WO Branch Chief, Pilot Standardization and the appropriate RAO (USFS), the National Flight Operations Manager (BLM), or appropriate State Aviation Official will nominate pilots who meet the qualifications and whom they consider to have the experience, aptitude, dedication, and ability to perform the duties of a Leadplane Pilot Final Evaluator.

Course Prerequisite

- Multi-Region experience as a qualified Leadplane Pilot 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/Human Factors – How to provide constructive criticism
- Policy

Leadplane Pilot/Trainee Performance Deficiencies

If a Leadplane Pilot/Trainee is observed performing unsafely/deficiently:

- The event will be discussed with the individual, and documented as appropriate.

- Depending on the agency, the documentation will be forwarded WO Branch Chief, Pilot Standardization and the appropriate RAO (USFS), the National Flight Operations Manager (BLM), or appropriate State Aviation Official. The individual may be made unavailable for Leadplane Pilot/Trainee assignments in the appropriate dispatch/status system.

Aerial Supervision Module (ASM)

An ASM is a crew of two specially trained individuals who retain their individual Leadplane Pilot and ATGS qualifications. Each crewmember 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 crewmember.

The Air Tactical Pilot (ATP) serves as the aircraft commander and is primarily responsible for aircraft coordination over the incident. Following Leadplane qualification, Leadplane Pilots are required to acquire one year of Leadplane experience in multiple geographic regions prior to operating as an ATP. This does not preclude the leadplane pilot from attending ASM training.

The Air Tactical Supervisor (ATS) serves as the mission commander who develops/implements strategy/tactics in conjunction with the Incident Commander (IC) and operations personnel. When no IC is present the ATS assumes those responsibilities until qualified ground personnel arrive. ATS initial candidates must be qualified as an ATGS Evaluator. This does not preclude the ATS candidate from attending ASM training.

The ASM is designed for initial attack operations, but can provide incident management teams with the flexibility of being able to alternate between operational functions until dedicated aerial supervision resources can be assigned to the incident.

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 Geographic Area Coordination Centers (GACC) report the status of the ASM crews as a national resource. The ATPs Leadplane Pilot designator is used in conjunction the federal ASM designator to identify the ASM. The State of Alaska ASM designator is A, Alpha. The Forest Service and BLM ASM designator is B (Bravo). The CALFIRE ASM designator is C (Charlie).

Resource Ordering – Federal Aerial Supervision Modules are a national resource and will be ordered in the same manner as Leadplanes or other national resources. The ATS and Leadplane Pilot should be rostered as subordinates to the aircraft on the resource order.

Flight and Duty Day Limitations

The ATS, when assigned to an ASM, will have the same flight and duty limitation as the ATP and are considered a crewmember. The ATS will match the ATP tour of duty for consistency and resource availability.

ASM Utilization

The ASM is a shared National resource and can be utilized in the following capacities:

- ASM, Leadplane, ATGS, Detection/Recon, All Risk, FEMA ESF4, etc.

Authorized Passengers

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

- Air Tactical Pilot/Air Tactical Pilot Trainee
- Evaluator Pilot/Final Evaluator Pilot
- Air Tactical Supervisor/Air Tactical Supervisor Trainee
- Evaluator ATS/Final evaluator ATS

Other passengers must be authorized in writing by the appropriate WO Branch Chief, Pilot Standardization or WO Branch Chief, Aviation Operations (USFS), the National Flight Operations Manager (BLM), or appropriate State 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/ATS)

Objective

- To establish the qualification and training requirements necessary to perform as an Aerial Supervision Module (ASM).

Nomination

- RAO's/Agency program managers will nominate candidates to attend ASM initial training.

Documentation of Training

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

- Course completion certificates
- Certification page of ATGS PTB for ATS
- Annual update of experience to agency specific Incident Qualification and Certification System.
- ATS/ATP Letter of Authorization.

Deviations or Exceptions – The WO Branch Chief, Pilot Standardization in coordination with the appropriate RAO and the WO Aerial Supervision Program Manager (USFS), the National Flight Operations Manager (BLM), or appropriate State 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 carried in the trainees training folder.

ASM Initial/Refresher Course of Instruction

Classroom Training

- ASM initial is a National Level Course.

Required Classroom Elements

- Safety
- Tactical Mission CRM
- Communications (Tactical)
- Aircraft Familiarization/Differences

- Tactics (ASM Specific)
- Airtanker/ Helicopter Sequencing

Optional Classroom Elements

- Crew interaction and CRM utilization
- Incident Command System-(Aerial Supervision Specific)
- Pre-season Update: (Program Updates/Changes, Expected fire behavior, Long-term weather prognosis)
- Additional elements may be added based on National trends and needs.
- GPS/Radio/Technology- Review

Operational Mission Instruction

ASM candidates should have a variety of on-the-job training. 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.

ATS 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 to occur during ASM Initial
- Initial on-the-job training must occur under the direct supervision of an ATS evaluator in the same aircraft.
- In rare circumstances, after initial on-the-job training, an ATS Evaluator may recommend ATS trainee be authorized to continue training with an ATP Evaluator without an ATS evaluator onboard the aircraft. Approval will be made on a case-by-case basis. A final evaluation must be conducted by an ATS Final Evaluator.

ASM Evaluation

The standard method for evaluating ATS performance is an actual or simulated mission utilizing the ASM Mission Evaluation form.

ATS Certification

Upon completion of the task book the ATS Final Evaluator will:

- Administer a final ASM mission evaluation, ensuring successful performance of the ATS (T)
- Return the completed task book to the ATS trainee along with recommendations
- Notify the appropriate agency program manager
- The ATS Trainee is responsible for submitting completed position task book, training documentation, and final recommendation to certifying official
- The WO Branch Chief, Pilot Standardization in coordination with the appropriate RAO (USFS), BLM National Flight Operations Manager, or State 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, ensuring successful performance of the ATP (T).
- Notify the appropriate agency program manager

- The ATP Trainee is responsible for submitting training documentation, and final recommendation to certifying official
- The WO Branch Chief, Pilot Standardization in coordination with the appropriate RAO (USFS), BLM National Flight Operations Manager, or State Aviation Official issues a Letter of Authorization to the employee and supervisor

ATS Supplemental Training

- Attend professional simulator training as a crew
- Agency provided Pinch Hitter Course -(Aircraft Specific)
- Private Pilot Ground School/Private Pilot Rating

ASM Currency

- 5 ASM missions per year
- ATP: ASM missions can be considered Leadplane missions. Leadplane missions do not count toward ATP currency
- The annual mission summary will be forwarded to the Agency Program Manager.
- If currency lapses a final evaluation must be performed on an actual/simulated mission.
- Attend an ASM refresher triennially.

ASM Deficiencies

- If an ASM is performing deficiently:
  - The event will be discussed with the individual, and documented as appropriate.
  - Depending on the agency, the documentation will be forwarded to the WO Branch Chief, Pilot Standardization and appropriate RAO (USFS), the National Flight Operations Manager (BLM), or appropriate State Aviation Official. The crew may be made unavailable for ASM assignments in the appropriate dispatch/status system. This may not make them individually unavailable for Leadplane or ATGS assignments.

Air Tactical Supervisor Coach

An ATS Coach serves as a point of contact and subject matter expert for the trainee throughout the training process.

Position Requirements

- Qualified ATS Evaluator

Responsibilities

- Help develop a training plan for the candidate.
- Coordinate with the Agency Program Manager and Employee Supervisor.
- Assure training is on track and that all requirements are being scheduled so as to not delay 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.

Air Tactical Supervisor Evaluator

ATS Evaluator provides consistent ATS instruction, evaluation, and feedback on ATS missions**.**

Position Requirements

- Qualified ATS.
- Administratively Determined (AD) are authorized for this position providing they meet the position requirements.
- Maintain ATS currency.
- Attend ASM Evaluator Workshop.
- The RAO/agency program manager will track ATS Evaluator.

Responsibilities

- Utilize applicable methods to promote ATS trainee progress and ultimate certification.
- Utilize training aids, best practices, forms, and policy documents to maximize the training experience.
- Review and complete applicable position task book elements.
- Document strengths, area for improvement, and focus areas utilizing the ASM Mission Evaluation Form.
- Provide feedback to the trainee's supervisor/coach.
- Share progress reports with ATS Evaluator community.
- Coordinate with trainee's supervisor to recommend and schedule final evaluation flight).

Aerial Supervision Module -Evaluator Workshop

Objective

Prepare ATS/ATP Evaluators to apply current and consistent training procedures.

- Target Group – Qualified ATS/ATP
- Workshop Instructor Requirement –ATS/ATP Evaluators and Final Evaluators

Nomination Process

The ATS working group, in conjunction with the WO Branch Chief, Pilot Standardization, appropriate RAO and the WO Aerial Supervision Program Manager (USFS), the National Flight Operations Manager (BLM), or appropriate State Aviation Official will nominate ATS/ATP's who meet the qualifications and whom they consider to have the experience, aptitude, dedication, and ability to perform the duties of an ATS/ATP Evaluator.

Course Prerequisite

- Multi-Region experience as a qualified ATS/ATP

Course Level

National Interagency

Course Content

- Instructional methods
- Utilization of the ASM Mission Evaluation Form
- Mission flights
- Lecture
- STEX

- AAR
- Standardization of instruction
- CRM/Human Factors – How to provide constructive criticism
- Training Aids
- Policy

Air Tactical Supervisor Final Evaluator

ATS Final Evaluators provide final ATS trainee evaluation and complete Final Evaluator verification page in the ATS position task book.

Position Requirements

- 1 Year of experience ATS Evaluator.
- Administratively Determined (AD) employees are NOT authorized to perform this function.
- Maintain ATS currency.
- Attend ASM Final Evaluator Workshop.
- The WO Branch Chief, Pilot Standardization in coordination with the appropriate RAO (USFS), the National Flight Operations Manager (BLM), or appropriate State Aviation Official will provide a letter of authorization to the ATS Final Evaluator upon completion of the requisite training.

Responsibilities

- Coordinate with ATS Evaluator and trainee's supervisor to schedule and implement a final evaluation.
- Perform final evaluation and complete ASM Mission Evaluation form.
- Complete the PTB.
- Review evaluation with ATS Trainee.
- Contact Trainees supervisor and review the final evaluation.

Aerial Supervision Module- Final Evaluator Workshop

Objective

Prepare ATS/ATP Final Evaluators to apply current and consistent training procedures.

- Target Group: Qualified ATS/ATP Evaluator
- Workshop Instructor Requirement –ATS/ATP Evaluators and Final Evaluators

Nomination Process

The ATS working group, in conjunction with the WO Branch Chief, Pilot Standardization, appropriate RAO and the WO Aerial Supervision Program Manager (USFS), the National Flight Operations Manager (BLM), or appropriate State Aviation Official will nominate ATS/ATP's who meet the qualifications and whom they consider to have the experience, aptitude, dedication, and ability to perform the duties of an ATS/ATP Final Evaluator.

Course Prerequisite

- Multi-Region experience as a qualified ATS/ATP Evaluator.

Course Level

National Interagency

Course Content

- Instructional methods
- Utilization of the ASM Mission Evaluation Form
- Mission flights
- Lecture
- STEX
- AAR
- Standardization of instruction
- CRM/Human Factors – How to provide constructive criticism
- Training Aids
  - Policy

Air Tactical Pilot Evaluator

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

Position Requirements

- 1 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 ATP currency.
- The WO Branch Chief, Pilot Standardization in coordination with the appropriate RAO (USFS), the National Flight Operations Manager (BLM), or appropriate State Aviation Official will provide a letter of authorization to the ATP Evaluator upon completion of the requisite training.

Responsibilities

- Utilize applicable methods to promote ATP trainee progress and ultimate certification.
- Utilize training aids, best practices, forms, and policy documents to maximize the training experience.
- Review and complete applicable position task book elements.
- Document strengths, area for improvement, and focus areas utilizing the ASM Mission Evaluation Form.
- Provide feedback to the trainee's supervisor/coach.
- Share progress reports with ATP Evaluator community.
- Coordinate with trainee's supervisor to recommend and schedule final evaluation flight).

Air Tactical Pilot Final Evaluator

ATP Final Evaluators provide final ATP trainee evaluation.

Position Requirements

- 1 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 ATP currency.

- The WO Branch Chief, Pilot Standardization in coordination with the RAO (USFS), the National Flight Operations Manager (BLM), or appropriate State Aviation Official will provide a letter of authorization to the ATP Final Evaluator upon completion of the requisite training.

Responsibilities

- Coordinate with ATP's supervisor to schedule and implement a final evaluation.
- Perform final evaluation and complete ASM Mission Evaluation form.
- Review evaluation with ATP Trainee.
- Contact Trainees supervisor and review the final evaluation.

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Chapter 4 – Policies, Regulations, and Guidelines

Incident aviation operations are often conducted under adverse flight conditions. Congested airspace, reduced visibility, poor weather and mountainous terrain all add risk and complexity to operations.

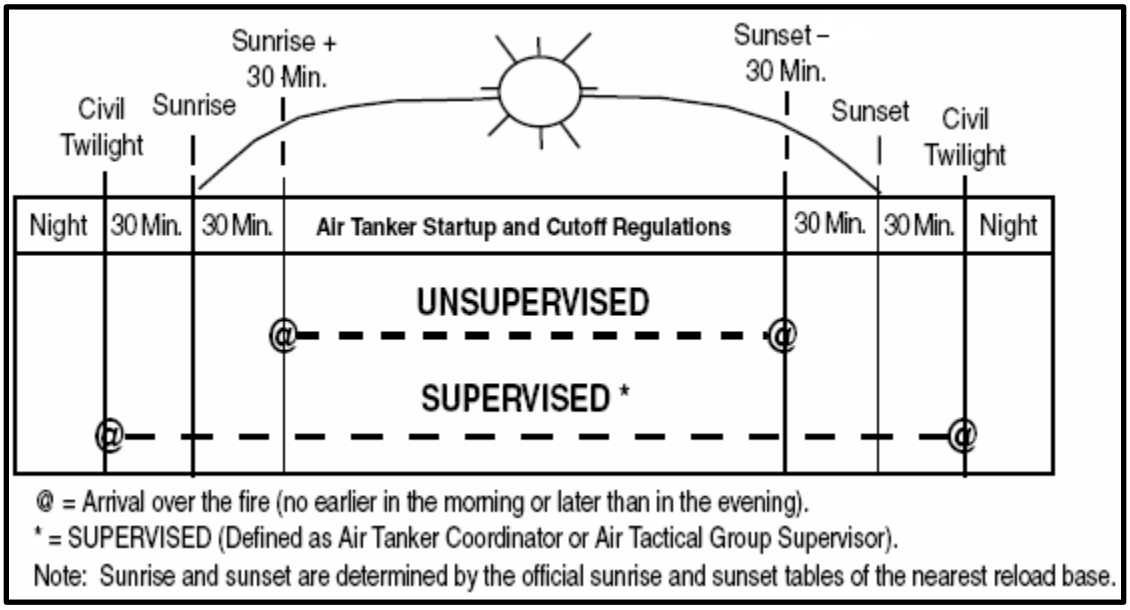
Complexity dictates the level of supervision required to safely and effectively conduct aerial operations. Aerial supervision may be provided by a Leadplane, ATCO, ASM, ATGS or HLCO.

Retardant operations and low light conditions (sunrise/sunset)

Multi-engine airtankers shall be dispatched to arrive over a fire (with no aerial supervision on scene) not earlier than 30 minutes after official sunrise and not later than 30 minutes before official sunset. Retardant operations will only be conducted during daylight hours. Retardant operations are permitted after official sunset, but must have concurrence by the involved flight crews. In addition, aerial supervision (Lead, ATCO, ASM, or ATGS) must be on scene. Daylight hours are defined as 30 minutes prior to sunrise until 30 minutes after sunset as noted in the table below.

Flights by multi-engine aircraft to assigned bases may occur after daylight hours.

Figure 3. Multi-engine Airtanker Startup and Cutoff Regulations



- In Alaska an airtanker pilot shall not be authorized to drop retardant during periods outside of civil twilight (see glossary).
- Single-engine airtankers (SEATs) and helicopters are limited to flight during the official daylight hours.
- If approved by an agency, turbine helicopters (single and multi-engine) may operate at night. Flight crews might experience late dawn or early dusk conditions based on terrain features and sun angle, and flight periods should be adjusted accordingly. 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.

Aerial Supervision Requirements

When aerial supervision resources are co-located with retardant aircraft, they should be launched together on the initial order to maximize safety, effectiveness, and efficiency of incident operations. Incidents with three or more aircraft assigned should have aerial supervision ordered. Federal policy dictates additional requirements as listed below.

Table 1. Incident Aerial Supervision Requirements

Situation	Lead/ ASM	ATGS
Airtanker not Initial Attack (IA) rated.	Required	*****
MAFFS	Required	*****
Very Large Airtanker (VLAT)	Required	*****
When requested by airtanker, ATGS, Lead, ATCO, or ASM	Required	Required
Foreign Government airtankers.	Required if no ATGS	Required if no Lead/ATCO/ASM
Multi-engine airtanker: Retardant drops conducted between 30 minutes prior to, and 30 minutes after sunrise, or 30 minutes prior to sunset to 30 minutes after sunset.	Required if no ATGS	Required if no Lead/ATCO/ASM
Single-engine airtanker (SEAT): SEATS are required to be "on the ground" by ½ hour after sunset.	See level 2 SEAT requirements	See level 2 SEAT requirements
Level 2 SEAT requirements: Level 2 rated SEAT operating on an incident with more than one other tactical aircraft on scene.	Required if no ATGS	Required if no Lead/ATCO/ASM
Retardant drops in congested/urban interface areas.	Order	May use if no Lead/ATCO/ASM
Periods of marginal weather, poor visibility or turbulence.	Order	Order
Night helicopter water dropping operations- 2 or more tactical or non-incident helicopters.	Not Applicable	Order

- **Required**: Aerial supervisory resource(s) that shall be over the incident when specified air tactical operations are being conducted.
- **Ordered**: Aerial supervisory resources that shall be ordered by the controlling entity (Air tactical operations may be continued while the aerial supervision resource is enroute to the incident. Operations can be continued if the resource is not available.)
- **Assigned**: Tactical resource allocated to an incident. The resource may be flying enroute to and from, or on hold at a ground site.

Foreign Government Aircraft on United States Incidents

Under international cooperative agreements the USDA-USFS, DOI-BLM and state agencies may enlist the assistance of Canadian air tactical resources on United States' incidents. A Canadian Air Attack Officer flying in a Bird Dog or Leadplane aircraft will

normally come with Canadian airtankers. The Canadian Airtanker communications system is compatible with USDA-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 this chapter.
- A U.S. ATGS, ASM, or Leadplane shall supervise Canadian airtankers. In the absence of a Leadplane or ASM, the Canadian Air Attack Officer/Bird Dog is authorized to direct 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 Lead are assigned to a cooperator incident employing Canadian air resources; the incident will be managed as outlined in above in this chapter.

Authorization to Lead United States Airtankers

Only federally (U.S.A.) approved Leadplane/ASM pilots are authorized to lead United States federally procured airtankers on airtanker drops. Canadian Air Attack Officers/Bird Dogs are not authorized to "lead" U.S. tankers.

Flight Condition Guidelines

Aerial Supervision personnel must carefully evaluate flight hazards, conditions (visibility, wind, thunder cells, turbulence, and terrain) to ensure that operations can be conducted in a safe and effective manner. The following policies and guidelines are designed to do this:

Visibility

Regardless of time of day, when poor visibility precludes safe operations, flights will be suspended. It is recommended that all incident aircraft fly with landing and strobe lights on at all times. It is required that Leadplanes fly with landing and strobe lights on at all times. Regular position reporting is critical in marginal visibility conditions.

Night

Night air operations are approved by the Forest Service. Night air operations will be conducted in Visual Flight Rules (VFR) conditions only. Night air operations aircraft should avoid fog and smoke. Flights may need to be suspended if smoke or fog effect safe operations. All night air operations aircraft shall fly with landing and strobe lights on. Regular position reporting is critical during night air operations. Reference USFS Night Air Operations Plan

Hazardous Conditions

Moderate to high winds and turbulent conditions affect flight safety and water/retardant drop effectiveness. A number of factors including terrain, fuel type, target location, resources at risk, cross- winds, etc., must be considered. When safety-of-flight is or may be compromised, water/retardant drops become ineffective, or at pilot recommendation aerial operations should cease. Refer to the Incident Response Pocket Guide (IRPG) PMS 461 refusal of risk process.

Evaluate thunder storm and other hazardous weather activity 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: Interagency Aviation Accident Prevention Bulletin 13-04, MAFFS operations plan, Federal Aviation Regulations (FAR)/Aeronautical Information Manual (AIM).

Any Aerial Supervisor, pilot, or ground resource can halt operations to mitigate risk or hazardous situations.

Air Attack Pilot Policy

Pilots flying air tactical missions must be Agency approved. Pilot 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 Forest Service or OAS Pilot Inspector. Qualification for air tactical missions shall be indicated on the back side of the Airplane Pilot Qualification Card. Pilots being considered for air tactical missions should be experienced aerial observer pilots or pilots with tactical CALFIRE experience.

Pilot Orientation and Training

Prior to flying their initial air tactical mission, preferably pre-season, the pilot shall receive a basic orientation/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
- 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 Temporary Flight Restrictions (TFRs), flight patterns, etc.)
- Operations safety
- Standard operating procedures
- Fuel management
- Dispatch readiness, availability for duty
- Records

Personal Protective Equipment (PPE) Policy

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

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

Leadplane and ASM

- **Policy**: The use of PPE by personnel engaged in Leadplane/ASM operations is required as per agency policy. This requirement is stated in various publications, including the USDA Safety and Health Handbook, FSH 6709.11, Chapter 3, the Department of the Interior (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 DOI Departmental Manual (351 DM 1).

Requirements

- **Flight Suit –** One-piece fire-resistant polyamide or aramid material or equal. The use of wildland firefighter Nomex® shirts and trousers (two-piece) is authorized.
- **Protective Footgear –** Leather boots shall extend above the ankle. Such boots may not have synthetic insert panels (such as jungle boots).
- **Gloves –** Gloves made of polyamide or aramid material or all leather gloves, without synthetic liners. Leather gloves must cover wrist and allow required finger dexterity.
- **Flight Helmets** – Aerial Supervision from helicopters requires a flight helmet.

Oxygen Requirements

Flights must comply with the FAA regulations they operate under.

Part 135

14 Code of Federal Regulations (CFR) part 135.89: Supplemental oxygen must be available and used by the flight crew at cabin pressure altitudes above 10,000 feet Mean Sea Level (MSL) for that portion of the flight more than 30 minutes duration. At cabin pressure altitudes above 12,000 feet (MSL) the flight crew (including aerial supervisors) must use supplemental oxygen during the entire flight.

Part 91.211

Supplemental oxygen must be available and used by the flight crew at cabin pressure altitudes above 12,500 feet (MSL) for that portion of the flight more than 30 minutes duration. At cabin pressure altitudes above 14,000 feet (MSL) the flight crew (including aerial supervisors) must use supplemental oxygen during the entire flight. At cabin pressure altitudes above 15,000 feet, (MSL) all passengers must have supplemental oxygen available during the entire flight.

Note: Refer to aircraft contract for specific information to reference what FAR part to utilize.

Day/Night Flight Policy

Twin-Engine Fixed-Wing

These aircraft are not limited to daylight operations. The aircraft can travel to or work over the incident before sunrise and after sunset as long as the aircraft and pilot are equipped/authorized for Instrument Flight Rules (IFR) operations. 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.

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 61as 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 or lighted airports.

USFS – Low level helicopter night flight operations will primarily be conducted using Night Vision Goggles (NVG), 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 and/or aircraft contract.

Flight Crew Duty Day and Flight Hour Policy

Refer to the Interagency Standards for Fire and Aviation (Red Book), Aviation Chapter, for current Interagency Interim Flight and Duty Limitations.
https://www.nifc.gov/policies/pol_ref_redbook.html

Avionics Standards

Radio Requirements

Refer to specific contract specifications and typing standards. Supervision of incident aircraft requires that the ATGS have the minimum capability of monitoring/transmitting on two Variable High Frequency (VHF)-FM frequencies, including an Air Guard, which can be continuously monitored, and two VHF-AM frequencies.

Table 2. Interagency Avionics Typing Standards

Required Avionics Equipment	Type 1	Type 2	Type 3	Type 4
Aeronautical VHF-AM radio transceiver	**2 each**	**2 each**	**2 each**	**2 each**
Aeronautical VHF-FM radio transceiver	2 each	1 each	1 each	
Panel mounted aeronautical Global Positioning System (GPS)	1 each	1 each		
Handheld GPS			1 each	1 each

Required Avionics Equipment	Type 1	Type 2	Type 3	Type 4
Separate audio control systems for pilot and ATGS	X	X		
Single audio control system			X	X
Audio/mic jacks with Push-to-talk (PTT) capability in a rear seat connected to co-pilot/ATGS audio control system	X	X		
Intercommunication system	X	X	X	
Plug for auxiliary VHF-FM portable radio or one additional VHF-FM transceiver	X	X		
Accessory Power Source				X
Portable Air Attack Kit				X

- **VHF-FM radio(s)** – Must be capable of simultaneously monitoring two frequencies (Narrowband 138 to 174 MHz).
- **Air Guard** – (168.625 MHz with transmit tone 110.9) is permanently programmed in the VHF-FM radio. **This frequency must be continuously monitored.**
- **Tactical Frequencies** – VHF-FM radio(s) must be capable of storing several tactical frequencies and associated Continuous Tone-Coded Squelch System (CTCSS) tones (if applicable) such as air-to-ground, dispatch, flight following and command.
  - **National Flight Following** – VHF-FM (168.650 MHz with TX and RX tone of 110.9) is used for point-to-point flight following.
  - **VHF-AM radio(s)** – Two VHF-AM radios are required (see table above) that monitor 118 to 136.975MHz.

  Note: *USFS Region 5 and the CAL FIRE require three VHF-AM and three VHF-FM radios in the ATGS aircraft.*

In-flight Communications Failure

At time of dispatch, all aircraft must have both VHF-FM and VHF-AM 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.
- **VHF-FM System Failure** – Report problem to other aircraft and dispatch (if able) on VHF-AM system and return to base.
- **VHF-AM System Failure** – Report problem to other aircraft, Incident Commander and Dispatch on VHF-FM system and return to base.

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 (NTIA).
- VHF-AM is allocated by the federal Aviation Administration (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 geographic area coordination centers.

Communications Guidelines

Flight Following

A frequency is assigned by the dispatch center for check-ins and incident related information. National Flight Following (NFF) frequency (168.650 Tx/Rx. Tone 110.9 Tx/Rx) is the primary flight follow frequency, local units may assign an additional (VHF-AM or VHF-FM) based on unit policy. Aircraft flying long distance missions (i.e. cross country) may be required to use the national frequency. 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.

Consult the local dispatch center for local procedures.

Air-to-Ground Communications

It is essential to have a dedicated air-to-ground frequency that is continuously monitored by appropriate resources. The ATGS must always return to air-to-ground after using other VHF-FM frequencies.

- **Initial Attack** – Many agencies have pre-assigned FM or AM air-to-ground for different geographic areas. Other agencies use standard work channel frequencies.
- **Extended Attack Incidents** – A discreet frequency should be assigned if there are no radio conflicts with other incidents. These frequencies must be ordered through the dispatch system.
    - **Project (large scale, long-term) Incidents** – National Incident Radio Cache (NIICD) radios are programmed with five air tactical frequencies that can be used for air-to-ground communications. Other frequencies can be assigned if there are no radio conflicts with other incidents. These frequencies are assigned by the incident's Communication Unit Leader and are listed in the ICS-220 (Air Operations Summary), and ICS-205 (Incident Radio Communication Plan).

Air-to-Air Communications

Communication between all airborne incident aircraft is critical to safety and effectiveness. Air-to-air communications is usually accomplished using a VHF-AM frequency. California typically uses a VHF-FM for air-to-air communications which requires 3 FM radios.

- **Primary Air-to-Air** –Air-to-air frequencies are assigned on an aircraft dispatch form. Agencies may have pre-assigned air-to-air frequencies for initial attack in different geographic areas. Extended attack incidents often require a discreet air-to-air frequency. Project scale incidents have discreet air-to-air frequencies assigned by the incident's Communication Unit Leader that are listed in the ICS-220 (Air Operations Summary), and ICS-205 (Incident Radio Communication Plan).
- **Secondary Air-to-Air** – Air-to-air frequencies are assigned on an aircraft dispatch form 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 enroute to the incident can check in. A discreet air-

to-air frequency may be required for Leadplane operations.

- **Obtaining Air-to-Air Frequencies** – Initial and extended attack air-to-air frequencies are obtained through the local dispatch. Project and incident air-to-air frequencies are obtained through the Communications Unit Leader or through the host dispatch center.

Air-to-Air Continuity

The ATGS must monitor all assigned air-to-air frequencies. The ATGS must also maintain continuous air-to-air communications with other 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 USDA/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 ground-to-aircraft communications
- Long range dispatch contact (when use of the designated flight following frequency does not result in contacting dispatch)
- Initial call, recall, and redirection (divert) of aircraft

Air-to-Air Enroute Position Reporting

During periods of poor visibility a special VHF-AM or FM frequency may be established for inter-aircraft position and altitude reporting enroute to and from or over incidents.

Backcountry Airstrips / Uncontrolled Airstrips

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

Conflicting Radio Frequencies

When multiple incidents in relatively close proximity (less than 100 miles) are sharing the same tactical frequencies, interference can seriously impair operations. The ATGS must recognize this and request different frequencies through dispatch or the Communications Unit Leader. ATGS may select a "LOW" transmit power setting, if available during deconfliction issues. A local (geographic area) frequency coordinator and the National Incident Radio Support Cache (NIRSC) should be involved when assigning frequencies where several incidents are in close proximity.

Tone Guards

Tones have been established by some agencies to allow the use of more frequencies selectively. The tone can be programmed, or selected, in tactical aircraft VHF-FM radios.

Air Resource Identifiers

- ATGS identifier is "Air Attack"
  - Enroute to/from incident – options include:
    - Unit name (ex. Beaver Air Attack)

        - Unit assigned identifier (ex. Air Attack 621)
        - Aircraft "N" number (ex. Air Attack 81C)
        - Working an incident – use incident name (ex. Cougar Air-Attack)
- HLCO identifier is "Helco" (apply principles from ATGS example above).
- The federal ASM identifier is "Bravo", state of Alaska units use "Alpha", and CALFIRE uses "Charlie."
- Lead identifier is "Lead."
    - Leadplanes – Pilots are assigned a one or two-digit identifier (ex. Lead 1 is "Lead one" and Lead 0-1 is "Lead zero one").
- Airtanker: Tanker plus identification number (ex. Tanker 21).
- Scooper: Scooper plus identification number (ex. Scooper 260).
- Helitanker: Helitanker and identification number (ex. Helitanker 742). Applies to Interagency Airtanker Board approved Type 1 fixed tank helicopters.
- MAFFS: MAFFS plus identification number (ex. MAFFS 6).
- Helicopter: Copter plus last three characters of N-number (ex. Copter 72 Delta) or a locally assigned agency identifier (ex. Copter 534).
- Smokejumper Aircraft: Jumper plus last two characters of N-number (ex. Jumper 41) or an agency assigned identification number.
- Other Fixed-Wing: Other fixed-wing are identified by "make or model prefix" plus last three characters of N-number (ex. Cessna 426).
- Other Identifiers:
    - Air Ops: Air Operations Director
    - Air Support: Air Support Group Supervisor
    - Operations or 'Ops': Operations Section Chief

Message Sequence

Protocol requires the resource you are calling be stated first, followed by your identification. "Tanker 23, Trinity Air Attack." Make messages as short and concise as possible.

Frequency Identification

Monitoring several frequencies sometimes makes it difficult to determine which frequency is being heard. When making initial contact, state the frequency you are transmitting on: "Lead 68, Bear Air Attack on Victor 118.250."

Airspace Policy

The *Interagency Airspace Coordination Guide c*overs all aspects of wildland agency airspace management. Aerial supervision personnel must be familiar with information in the guide. Dispatch centers and tanker base managers should have a copy available for reference.

Federally Designated Special Use Airspace (SUA)

Incidents may be located in, or flight routes to incidents may pass through, areas designated by the Federal Aviation Administration (FAA) as Special Use Areas. Operations through, or within these areas, may require that specific procedures be followed.

Special Use Airspace (SUA) "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).

Special Use Airspace Locations: All areas except CFAs are identified on National Oceanic and Atmospheric Administration (NOAA) Aeronautical Sectional Charts. Many of these are located in wildland areas throughout the United States.

Procedures: The Interagency Airspace Coordination Guide and the FAA Handbook 7400.2C (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 SUA's, 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.

- **Restricted Areas** – 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.
- **Military Operations Areas (MOA's)** – Many MOA's in the Western United States are located in airspace over agency lands. Current information regarding MOA scheduling is published in the Area Planning (AP/1B) Handbook and Charts. When wildfires occur within these areas, the responsible agency should notify the controlling agency and notify them that incident aircraft will be affected area. Do not assume that there will be no military activity in the area. Authorization is not required to enter a MOA. However, the controlling agency may alter operations in the vicinity of the incident thus increasing the margin of safety.
- **Military Training Routes (MTR's)** – MTR's are located over many agency lands in the United States. Centers should have daily schedule information (hot routes) and may notify the FAA and Military.
- **Scheduling Activity** when incident aircraft may conflict with military aircraft on or near the MTR's. Do not assume an MTR has been de-conflicted.
- **Other Military Training Routes and Areas** – While the MOA's and MTR's are charted on sectional maps and the AP/IB charts, Slow Speed Low-Altitude Training Routes (SR's) and Low-Altitude Tactical Navigation Areas (LATN's) 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 enroute to, near or within the operations area.

Incident Airspace; the Fire Traffic Area (FTA)

See Appendix D for FTA diagram and additional information. 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 FTA rules apply to the TFR and clearance from the controlling aircraft is required prior to TFR entry. 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 other aircraft who have legal access within a TFR (Medevac, Law Enforcement, Media, VFR airport traffic, IFR traffic cleared by the FAA).

Key components and procedures of the FTA include:

- **Initial Communication (ICOM) Ring** – A ring 12nm from the center point of the incident. At or prior to 12nm, 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 supervision resource over the incident (ATGS, ATCO, ASM, and HLCO).
- **No Communication (NOCOM) Ring** – A ring 7nm from the center point of the incident that should not be crossed by inbound aircraft without first establishing communications with the appropriate aerial supervision resource.
- **Three (3) C's of initial contact** – Communication requirements and related actions to be undertaken by the pilot of the inbound aircraft:
  - **Communication** – Establish communications with the controlling aerial supervision resource over the incident (ATGS, ATCO, ASM, HLCO).
  - **Clearance** – Receive clearance from aerial supervision resource to proceed to the incident past the NOCOM ring. Inbound pilot will acknowledge receipt of clearance or (hold) outside the NOCOM ring until the clearance is received and understood.
  - **Comply** – Inbound aircraft will comply with clearance from aerial supervision resource. 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 establish/deconflict routes for departing aircraft through or away from other incident aircraft operations.

Temporary Flight Restriction (TFR)

Under the conditions listed below the responsible agency should request a temporary flight restriction under FAR Part 91.137. A TFR may be initiated by the dispatch center, Incident Commander, Air Operations Branch Director, Lead, ASM, or ATGS.

For more information, refer to the *Interagency Airspace Coordination Guide or FAR Part 91.137.*

Considerations for Requesting a TFR

- Length of operation: Extended operations (>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 Military Training Routes
- Extended Operations within Special Use Airspace
- **Aerial Supervision Responsibility & TFRs** – During the initial attack phase of an incident, the aerial supervisor may initiate a request for a TFR. The aerial supervisor should complete critical information required on the Interagency Request for Temporary Flight Restriction form and radio this information to the responsible dispatch coordination center. On Type 1 or 2 incidents, the ATGS in consultation with the Lead or ASM, will advise the Air Operations Branch Director when the dimensions of the TFR should be increased or decreased. These changes must be forwarded immediately to the dispatch center that will initiate a new order to the FAA. The aerial supervisor should coordinate with the incident Air Operations Branch Director or local dispatch office as appropriate to recommend termination of an existing TFR. Aerial supervision aircraft not assigned to the incident must stay clear of TFRs unless

communication is established with the controlling entity (ATGS, ASM, Leadplane, etc.) and authorization is given to enter the TFR.

Ordering a TFR – Three pieces of information are required:

- Center point in DMS format
- Vertical dimension in feet MSL
- Horizontal radius in NM from center point
  - Non-standard/non-circular TFR dimensions require points in DMS format at each corner of the polygon.

Guidelines for TFR Dimensions – The *Interagency Airspace Coordination Guide* covers this subject in detail. Factors which must be considered are:

- The type and number of aircraft operations occurring within the incident airspace and their aeronautical requirements;
- the operating altitude to provide the ATGS a safe and good vantage point;
- entry and exit points and routes;
- other aircraft operations in the geographical area;
- size, shape and rate of increase of the incident;
- location of incident helibases, water sources, etc;
- and; location of commercial airports

TFR Lateral Dimensions: The suggested guideline for a TFR is 5NM radius from the center point. However, there is the need to take the impacted airspace, geographical features and the rate of spread of the wildfire into consideration. If necessary, **a 7NM radius is recommended.** Any aircraft operating base within "reasonable distance" should be included (helibase, heli-dip site). Lateral dimensions may be much greater on large incidents. The lateral dimensions/shape may be irregular to conform to actual requirements. Dimensions should be no more than you need. 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 terrain (ground level) in the affected area or 2000 feet above the highest flying aircraft. If necessary, **3,500 feet is recommended.** The vertical and lateral dimensions of the desired airspace may conflict with FAA requirements and what they will approve. The FAA, through the dispatch center, will provide the approved TFR dimensions. If airspace needs are not met, request new TFR dimensions. Again, the adjusted TFR requires FAA approval.

TFRs for Multiple Incidents in Close Proximity – Multiple incidents in close proximity may result in overlapping restrictions. To avoid confusion the respective dispatchers and Air Operations Branch Directors should consolidate multiple TFR's into one manageable TFR. This will need to be negotiated between agencies and IMT's. Frequency management will also need to be considered. As long as 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 commonly requested TFR for wildfire is 91.137 (a)(2).

- Volcanic eruption, toxic gas leaks, spills.
- Forest and range fires, earthquakes, tornado activity, etc. Disaster/hazard incidents of limited duration that would attract an unsafe congestion of sightseeing aircraft, such as

aircraft accident sites.

- Incidents/events generating high public interest such as sporting events.

Non-Incident Aircraft TFR Policy

14 CFR 91.137 (a) 2 prescribes how Temporary Flight Restrictions are established to provide a safe environment for the operation of disaster relief aircraft. When a Notice to Airmen (NOTAM) has been issued under this CFR section, all aircraft are prohibited from operating in the designated area unless at least one of the following conditions is met:

- "The aircraft is participating in hazard relief activities and is being operated under the direction of the official in charge of on scene emergency response activities."
- "The aircraft is carrying **law enforcement** officials."
- "The aircraft is operating under the Air Traffic Control (**ATC) approved Instrument Flight Rules (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 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."
- "The aircraft is carrying **properly accredited news representatives**, and prior to entering the area, a flight plan is filed with the appropriate FAA or ATC facility specified in the Notice to Airmen and the operation is conducted above the altitude used by the disaster relief aircraft, unless otherwise authorized by the official in charge of on scene emergency response activities."

Note: According to FAA JO7210.3Z "Coordination with the official in charge of on scene emergency response activities is required prior to ATC allowing any IFR or VFR aircraft to enter into the TFR area." The FAA Advisory Circular 91-63C states "Notification must be given to the ATC/Flight Service Station (FSS) specified in the NOTAM for coordination with the official in charge of on scene emergency response activities."

Some accommodations (for flights such as early morning agricultural spraying operations) can be made through the establishment of time specific Temporary Flight Restrictions that releases the airspace for use after hours.

With no legal authority to waive 14 CFR 91.137 and allow nonparticipating aviation, which do not meet at least one of the access conditions identified on previous page, to "pass through" the TFR area, ATGS, ASM and HLCO have only two options: (1) Release the TFR (through normal ordering channels) to accommodate the requests (2) **Advise the requestor that they will have to continue to fly around the TFR for their own safety.**

Air Operations 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 5714.11. When such are necessary, they may be authorized 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 Leadplane is ordered to coordinate aerial operations.
- The air traffic control facility responsible for the airspace is notified prior to or as soon as possible after the beginning of the operation.

- A positive communication link must be established between the airtanker coordinator or the aerial supervision module (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 another code is assigned by air traffic control.

Responses to Airspace Conflicts and Intrusions

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 depart restricted area (assign an altitude and heading if necessary). Request the intruder to stay in radio contact until clear of the area.
- If the aircraft is a legitimate "nonparticipating" aircraft and has the authority 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

- The ATGS may request, but not demand that the aircraft check in with the ATGS as needed. If radio contact is not established:
  - No attempt to drive, guide or force the intruder from the area should be made. The aerial supervisor must monitor intruder's position, altitude, and heading.
  - Try to ascertain the N-number without imposing a hazard.
  - The aerial supervisor must ensure that incident aircraft are informed and kept clear of intruder. This may require removing incident aircraft and curtailing 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 the local ARTCC.
  - Submit a Mishap or SAFECOM Report as per agency policy and procedures.

Special Use Airspace Reminders

- Check with dispatch when receiving the Resource Order.
- Is the incident in SUA?
- Is the Restricted Area/MOA/MTR "hot" or about to be?
- Confirm military has been notified and what action will be taken.
- The pilot must obtain clearance/routing through or around restricted areas enroute to

the incident.

- Always be alert for military aircraft even when SUA/MTRs are "cold."

Canadian Airtankers on U.S. Border Fires

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

- Normally this group includes two tankers 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/unless an ATGS is present.
- When a U.S. ATGS is on scene, the ATGS has overall responsibility for the airspace. The Bird Dog is in charge of directing Canadian Airtanker operations much like a Leadplane 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 with regard to utilization of Canadian air resources.
- The local unit Dispatch should coordinate flights with Air and Marine Interdiction Coordination Center at 1-866-AIRBUST.

Chapter 5 – 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 USDA Forest Service, DOI Office of Aviation Services, US 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/USFS Interagency Aviation Training site at: https://www.iat.gov/docs/aircraft_library/index.asp.

Very Large Airtankers (VLAT)

VLAT Operations

The Standard Operating Procedures listed below are to be considered when using VLAT on wildland fires. The SOPs below have made the operation with the VLAT cohesive and safe with other aerial resources.

VLAT considerations

- Establish flight paths holding areas/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.

Large Airtanker

The Incident Command System (ICS) recognizes four categories or classifications of airtankers based on gallons retardant/suppressant capability. The Very Large Airtanker classification/type exists only in Forest Service contract language.

Airtanker Type 1

- approved by the Interagency Airtanker Board and the contracting agency
- 3,000 minimum gallon capacity

Airtanker Type 2

- approved by the Interagency Airtanker Board and the contracting agency
- 1,800 – 2,999 gallon capacity

Airtanker Type 3

- approved by the Interagency Airtanker Board and the contracting agency
- 800 – 1,799 gallon capacity

Airtanker Type 4

- Approved by the Department of the Interior, and contracting agency
- Less than 800 gallons

Table 3. Airtanker Classification

(does not account for retardant download requirements)

Type	Aircraft Make & Model	Maximum Gallons	Cruise Speed	Tank/Door System
VLAT	DC-10	11,900	378 kts	3 Constant Flow Tanks
VLAT	747	19,600	500 kts	1 Pressurized System
Type 1	C-130 (MAFFS)	3,000	300 kts	1 Pressurized System
Type 1	C-130	3,000	300 kts	1 Constant Flow
Type 1	DC-7	3,000	235 kts	8
Type 1	BAE-146, RJ, MD-87	3,000	300 kts	1 Variable Flow
Type 2	DC-6	2,450	215 kts	8
Type 2	P2-V	2,450	184 kts	6
Type 3	CL-215, Scooper	1400 Water	160 kts	2 (foam capable)
Type 3	CL-415, Scooper	1600 Water	180 kts	4 (foam capable)
Type 3	S2 Tracker	800	180 kts	4
Type 3	S2 Turbine Tracker	1,200	230 kts	Constant Flow
Type 3	Air Tractor AT-802 F	800	170 kts	Constant Flow
Type 4	Air Tractor AT-802/602	600-799	160 mph	1 (in-line or horizontal)
Type 4	Turbine Thrush	400-770	140 mph	1 (in-line or horizontal)
Type 4	Turnbine Dromader	500	140 mph	1 (in-line or horizontal)
Type 4	Piston Dromader	500	115 mph	1 (in-line or horizontal)

Airtanker Retardant Delivery Systems

Due to the number of approved airtanker makes/models and the number of airtanker operators there are several approved tank/door systems. The tank/door systems are now evaluated and approved by the Interagency Airtanker Board 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 .5 GPC to +8 GPC.
- **Pressurized Tank System** – Modular Airborne Fire Fighting Systems (MAFFS) C-130s are equipped with a pressurized system to discharge their 3,000 gallons of retardant through one (18") dispensing nozzle. The system is capable of Coverage Level (CL) 1, 2, 3, 4, 5, 6, and, 8. The line width is about 70% of conventional systems, but is more continuous throughout the drop.
- **Standard Tank System** – This system is common on SEATs. Single or multiple tanks/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 airtanker that is on contract with a cooperator and may not meet Forest Service or Department of the Interior contract standards or policy and may not meet National Association of State Foresters Cooperator Aviation Standards.

If a wildland fire on Federal lands is threatening life and public safety, and no federally approved air tankers are available to meet the time frames, but a non-federally approved air tanker is available the designated GACC operations officer can assign the use of the non-federally approved airtanker. The GACC duty officer will notify the appropriate aviation contact(s) at the National and Regional/BLM State Offices of this action. The GACC will then attempt to reassign a federally approved air tanker as soon as possible, documenting the non-federally approved airtanker's use. Once a comparable federally approved airtanker is on scene of the incident or when the threat to life and public safety has been alleviated, the non-federally approved airtanker will be released.

Non-federally approved airtankers are permitted to reload out of Federal airtanker bases, following the standards established in the Interagency Airtanker Base Guide.

Helicopters

ICS categorizes three types of helicopters based on minimum gallons of water/retardant, lift capability, number of passenger seats, and pound card 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: Heavy
- Helicopter Type 2: Medium
- Helicopter Type 3: Light

Table 4. Helicopter Classification

Helicopter Type	Aircraft	Typical Payload at 8000' Density Altitude (lbs)	Typical Payload at 11,000' Density Altitude (lbs)
Type 1 (Heavy)	Sikorsky S-64E (Aircrane)	12,700	9,117
Type 1 (Heavy)	Sikorsky S-64F (Aircrane)	15,640	10,288
Type 1 (Heavy)	Boeing 234 (Chinook)	19,063	15,363
Type 1 (Heavy)	Boeing 107 (Vertol)	4,656	3,424
Type 1 (Heavy)	Sikorsky S-61	4,038	2,221
Type 1 (Heavy)	Bell B-214	3,754	2,665
Type 1 (Heavy)	Aerospatiale 332L (Super Puma)	4,328	2,729
Type 1 (Heavy)	Aerospatiale 330 (Puma)	4,525	3,325
Type 1 (Heavy)	Kaman 1200 (Kmax)	5,288	4,588
Type 1 (Heavy)	Sikorsky CH-54 or CH-64 (Skycrane)	11,098	7,978
Type 1 (Heavy	Sikorsky S-70 (Firehawk)	6,569	5,669
Type 2 (Medium)	Bell B-212	1,973	1,010
Type 2 (Medium)	Bell B-205A-1	1,294	642
Type 2 (Medium)	Bell B-205A-1+	1,596	896
Type 2 (Medium)	Bell B-205A-1++ (Super 205)	2,806	2,120
Type 2 (Medium)	Bell B-412	1,742	884
Type 2 (Medium)	Sikorsky S-58T	1,635	597
Type 3 (Light)	Aerospatiale 315B (Llama)	925	925
Type 3 (Light)	Bell B-206 B3 (Jet Ranger)	715	380
Type 3 (Light)	Bell B-206 L3 (Long Ranger)	950	830
Type 3 (Light)	Bell B-206 L4 Long Ranger)	1,196	767
Type 3 (Light)	Bell B-407	1,315	880
Type 3 (Light)	Aerospatiale 350-B2 (Astar)	1,083	700
Type 3 (Light)	Aerospatiale 350-B3 (Astar)	1,972	1,911
Type 3 (Light)	Hughes 500 D	515	295

Helicopter Retardant/Suppressant Delivery Systems

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

- **Buckets** – Two types of helicopter buckets are used. These include:
  - Rigid Shell (100 to 3,000 gallons)
  - Collapsible (94-2000 gallons)
- **Tanks** – Internal and external tank systems have been developed for various Type 1-3 helicopters. These include:
  - Computerized metered or constant flow tank system
  - Conventional tank/door system

Note: Type 1 helicopters with fixed tanks are referred to as "helitankers"

Aerial Supervision Aircraft

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 good visibility.
  - Low-wing aircraft designed with the cockpit over the wings; provide for limited visibility.
- Helicopters:
  - Open cockpit designs facilitate excellent visibility. Consider potential issues derived from doors off in-flight.

Speed

For large, initial attack, and multiple incident scenarios, aircraft speed is important. On initial attack incidents in particular, it is key that the aerial supervisor arrive before other aerial resources in order to determine incident objectives and set up the airspace. Twin-engine fixed-wing aircraft are usually the best choice in these situations (150+ knots cruise speed with 200+ knots 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 10,000ft msl., consider a pressurized aircraft.

Endurance

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

Aircraft performance

Consider operating environment, payload, endurance, and training needs.

Maneuverability

It is essential that the aircraft can be positioned for the particular mission observation requirements. Helicopters are excellent for target identification and for monitoring and evaluating mission effectiveness. A Type 3 helicopter is generally the best platform for a helicopter coordinator.

Noise level

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

- Single-Engine Fixed-Wing – Highest cockpit noise level
- Twin-Engine Fixed-Wing – Less cockpit noise level
- Helicopters – Least cockpit noise level (flight helmet is required)

Initial Attack Incidents

It is generally best to be co-located with airtankers and Leadplanes at an airtanker base to facilitate briefings. It may be desirable to be located near a dispatch center for the same reason.

- **Large Incidents** – It may be desirable to be located at or near the incident to facilitate briefing and de-briefing with the Operations Section.
- **Airport Considerations**
  - **Single-Engine Fixed-Wing** – Can generally operate from shorter airstrips than twin-engine airplanes.
  - **Twin-Engine Fixed-Wing** – Require longer runways and usually require an improved surface.
- **Helicopters** – Helicopters are advantageous if the incident is not near any airport and if it is critical for the aerial supervisor to meet with the Operations Section Chief. Helicopters are generally utilized for HLCO, they may also be desirable for ATGS.
- **Cabin space** – Mission requirements may necessitate the need for an observer or an Air Tactical trainee/instructor in addition to minimum flight crew requirements.
  - **Safety** – Consider performance capability of the aircraft for the density altitude and terrain at which operations are conducted.
  - **Aircraft and Pilot Approvals** – Aircraft must have interagency approval to be used for an air tactical mission. The approval card must be carried onboard the aircraft. Similarly, pilots used for air tactical missions must possess a current approval card.
  - **Avionics Equipment** – In addition to the above avionics requirements, the following are typically required:
    - Headset(s) with boom microphones
    - Voice Activated Intercom
    - Separate Audio Panels for the pilot and ATGS/ATS
    - Separate volume and squelch controls for the pilot and ATGS/ATS
    - A separate audio panel and voice activated intercom station in a rear seat may be required in aircraft to accommodate an ATGS/ATS trainee (observer) of ATGS evaluator or ATGS Final Evaluator
- **Traffic Collision Avoidance System (TCAS/TCAD)** – The threat of midair collision is ever present in the fire environment. TCAS/TCAD is now part of the standard equipment in Leadplanes 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/Hoist Extraction.

The interagency community produces a hoist/extraction guide annually. Please refer to the document below:

http://www.fs.fed.us/fire/aviation/av_library/Revision_8_EHE%20Source%20List%20(03-01-14).pdf.

Smokejumper Aircraft

Smokejumper aircraft are turbine powered aircraft carrying 8 to 18 smokejumpers plus spotters and flight crew. Smokejumpers are primarily used for initial attack but are also used to reinforce large fires, build helispots, etc.

Modular Airborne Firefighting System (MAFFS)

http://www.fs.fed.us/fire/aviation/airplanes/maffs.HTML

Policy

The National Interagency Coordination Center (NICC) mobilizes Modular Airborne Firefighting Systems as a reinforcement measure when suitable 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, North Carolina and Wyoming may activate MAFFS units for missions within State boundaries under their respective memorandums of understanding with military authorities and the Forest Service. Approval of 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 USDA, Forest Service will provide the following resources:

- MAFFS unit "slip-in tank" systems.
- Qualified MAFFS Leadplane Pilot.
- 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 utilizing C-130 are based at the following locations:

- Charlotte, North Carolina (145th 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 Leadplane Pilot

Agency Leadplane Pilots must participate every 4 years to be re-qualified for operations with MAFFS. Qualified MAFFS Leadplane Pilots will be listed in the National Interagency Mobilization Guide.

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 crewmembers at the completion of the annual training currency requirements are as follows:

- MAFFS airdrop currency is required annually. If more than 120 days has elapsed since the last air drop, the crew's first air drop will be restricted to a target judged by the MAFFS Leadplane Pilot to offer the fewest hazards.
  - If more than eight months have elapsed since the last MAFFS air drop, an airborne MAFFS Leadplane Pilot supervised water drop 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 the fuselage cabin. The MAFFS call sign will be this number (i.e., MAFFS 2).

Supervision of a MAFFS Mission

- No MAFFS mission will be flown unless under the supervision of a qualified MAFFS Leadplane Pilot. The Leadplane Pilot will communicate with the MLO/AFMC daily on flight needs of military crews.
  - International MAFFS missions will utilize a qualified MAFFS Leadplane Pilot in the MAFFS aircraft to assist the Aircraft Commander with tactical requirements. Headquarters (HQ) Military Airlift Command (MAC) approval must be obtained prior to flying civilian personnel aboard MAFFS aircraft.
  - Lead 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.

Military Flight Duty Limitations

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

- A normal duty day is 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 Operating Procedures – Procedures for "working" MAFFS on an incident are the same as for contract airtankers. MAFFS flight crews are rotated on a regular basis. The AFMC will verify the status of the flight crews with the MLO. Leadplane Pilots should be aware that newly rotated flight crews may have restrictions on their initial air drops to accomplish currency requirements.

Operational Considerations – The procedures for using MAFFS over an incident are the 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 3000 gallons unless takeoff performance requires a download.
- **Load Portions** – Capable of Start/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 Interagency Airtanker board (IAB) criteria and remains consistent along the path of delivery.
- Reload – M2 can be sent to reload at pre-approved bases identified in the Interagency Airtanker Base Directory MAFFS Supplement. Normally, following the final air drop 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 Forest Service supplied P-25 compliant VHF-FM radio operating over the frequency band of 138 -174 MHz. Communications may also be conducted using a VHF-AM frequency in the 118-136.975 MHz bandwidth in the same manner as other contract air tactical resources.

Check in Procedure – The ATGS (or LEAD/ASM) in the absence of an ATGS) 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' enroute to the incident.

Dispatch Communications – The ATGS or Lead 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 (2006). 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

Occasionally conducted with regular military helicopters. If bucket operations are conducted, a Helicopter Coordinator (HLCO) shall be utilized whenever regular military helicopters are engaged in bucket operations.

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, a Helicopter Coordinator (HLCO) is required. Multi-ship operations may be conducted without a Helicopter Coordinator if at least one helicopter has compatible communications capability with civilian bandwidths.

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 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 Air Operations Branch Director to ensure planned use of National Guard assets complies with applicable policy and procedures specific to the local area and/or 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 to be addressed prior to use of National Guard aviation assets on federal or multi-jurisdictional incidents. Use of a Helicopter Coordinator (HLCO) should be considered to mitigate communications issues with ground and aviation resources on an incident.

Training & 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 make adjustments as appropriate to provide for the safe and effective use of National Guard resources.

Water Scooping Aircraft

Canadair CL-215, 415, and AT-802 Fire Boss

Policy and Availability

United States – Water scooping aircraft are located or utilized throughout the US and operate on a basis where water sources are conducive to operations. These aircraft are contracted by DOI, Forest Service and State Agencies.

USFS - Forest Service contracted water scoopers shall not be loaded with chemical retardant 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 supervisory platform may be available and stationed in R5 USFS Southern California Operations Center (SOPS). The standard hours of the aircraft availability will be 1800-0600 however can vary throughout the fire season to maximize coverage. The night aerial supervisory platform is ordered through the South Operations GACC.

Considerations

- Initial Attack Resource, may be used on large fires with concurrence from SOPS GACC.
- 14 hour duty day, 8 hour flight time within 24 hours.
- 10 hours off duty between shifts
- If planned use on extended attack or emerging incident make effort to allow ATGS to observe operations during daylight hours.
- Aircraft will respond from and return to designated base each shift.

Firewatch Aerial Supervision Platforms

The USFS Firewatch Aerial Supervision Helicopter is a Bell 209 Cobra Helicopter converted for use by the US Forest Service for use as an aerial supervision and intelligence gathering platform. There are two platforms in use in Region 5, Air Attack 507 and Air Attack 509. The platforms are Technology Enhanced Initial/Extended Attack ATGS platforms based in Redding and repositioned as needed.

Call Signs

For mission clarification:

- When in the ATGS profile the Firewatch Aerial Supervision Helicopter will use the call sign "Air Attack 507/509"
- When performing the HLCO mission, the call sign is "HLCO"
- For intelligence gathering, mapping or suppression resource support profile, the Firewatch Aerial Supervision Platform will use the call sign "Copter 507/509."
- **Mission Profiles** – The USFS Firewatch Helicopter will request entry into the fire traffic area in one of the following mission profiles:

  Tactical
  - ATGS
  - HLCO
  - Crew/suppression resource intelligence support

Intelligence

- Live video downlink
- Infrared imagery/video
- Mapping

Considerations

- Clearance for the Firewatch Platform (AA 507 or 509) into the Fire Traffic Area as an ATGS or HLCO should be the same as any relief or initial attack 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 in the Crew / Suppression Resource Intelligence Support profile, the Firewatch Platform may request low level, 500 AGL and below for direct crew support.
- When performing live down link operations aircraft may request 3,000 to 5,000 AGL altitudes for better "big picture" video feed.
- Work the Cobra into the traffic patterns as any direct suppression aircraft.
- Platform may request an offsite landing to pass the Remotely Operated Video Enhanced Receiver (ROVER) to the ground suppression resources.
- The Firewatch Helicopter is considered a type 2 aircraft for helispot sizing purposes.
- When mapping the incident is part of the mission, the Firewatch Platform will request transition to 500 feet AGL and below to complete the mission. The Firewatch ATGS will give the Aerial Supervision Platform an initial map starting point and either a clockwise or counterclockwise rotation of the perimeter request and follow the direction of the aerial supervisor.

Unmanned Aircraft Systems:

https://www.faa.gov/uas/

Chapter 6 – Suppression Chemicals

Wildland fire suppressants and retardants are chemical agents 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 Web site for details: http://www.fs.fed.us/rm/fire/wfcs/index.htm

Refer to the Interagency Standards for Fire and Fire Aviation Operations or the Web site noted above for the most current information on fire chemicals and their use.

Definitions

Suppressants (Direct Attack only):

A fire suppression chemical applied directly to the flame base to extinguish the flame (water, foam, gel/water enhancer).

Foam fire suppressants

Foam fire suppressants contain foaming and/or wetting agents. The foaming agents and percentage concentrate added 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. Foam may be applied by engines, portable pumps, helicopters, and SEATs. Some agencies also allow application of foam from fixed-wing water scoopers.

Wet Water

Wet water foam concentrates mixed at 0.1 - 0.3 percent will produce a wet water solution (low foam, high wetting ability).

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. They are fully approved for use in helicopter buckets and engine application. Many are also approved, at specific mix ratios, for use in SEATs, and fixed tank helicopters.

Long-Term Retardant (Direct and Indirect Attack):

- Long-term retardants contain fertilizer salts that change the way fuels burn. They are effective even after the water has evaporated, hence the name, "long- term." Retardants may be applied by large airtankers, single-engine airtankers (SEATs) helicopter buckets, and ground engines. 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 Ten Principles of Retardant Application, NFES 2048, PMS 440-2 pocket card.
- Retardant mixing, blending, testing, and sampling requirements can be found at the Wildland Fire Chemical Systems (WFCS) Web site, Lot Acceptance and Quality Assurance page: http://www.fs.fed.us/rm/fire/wfcs/laqa.htm.

- 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/Gels - Minutes up to possibly an hour or more (direct sunlight breaks down gels faster). Time will vary according to weather conditions (heat, humidity, wind, etc.)

Approved Fire Chemicals

Many different long-term 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 concentrates prior to mixing, depending on manufacture. All USDA/DOI bases must use chemicals that are either fully approved or "conditionally approved" during field evaluations for full approval.

Retardant Mixing Facilities

Long-term retardants are available from a variety of facilities including fire incident locations. Tactical effectiveness and cost effectiveness are greatly enhanced when temporary portable mix facilities are set up on or near the incident. Facilities may be ordered through the incident management system, from agency fire caches or directly from retardant manufacturers. Long-term retardants are available or can be mixed from:

- Permanent or Reload Retardant Bases.
- Remote Retardant Base: Modular retardant base entirely transportable by Type 1 helicopter, which are excellent for remote areas with no road access.
- Portable Retardant Base: Totally portable retardant mixing system used primarily to mix and load retardant into airtankers (SEATs, large airtankers and VLATs), helicopters and ground units.
- Portable Helicopter Retardant System: Similar to the Portable Retardant Base but is more specifically designed for use by helicopters.

Airtanker Base Information

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

- *Interagency Airtanker Base Operations Guide*, PMS 507: This guide defines and standardizes interagency operating procedures at all airtanker bases for contractor and government employees.
- *Interagency Airtanker Base Directory* – The directory is intended to aid wildland fire managers, pilots, and contractors who operate at airtanker bases (Reference NFES 2537).
- *Wildland Fire Chemicals Web site*: found at http://www.fs.fed.us/rm/fire/wfcs/index.htm

Aerial Fire Chemical Application Safety

- Personnel and equipment in the flight path of intended aerial drops should move to a

location that will decrease the possibility of being hit with a drop.

- Personnel near aerial drops should be alert for objects (tree limbs, rocks, etc.) that the drop could dislodge. The Incident Response Pocket Guide (IRPG) provides additional safety information for personnel in drop areas.
- During training or briefings, inform all fire personnel of environmental guidelines and requirements for fire chemicals application and avoid contact with waterways.
- Avoid dipping from rivers or lakes with a helicopter bucket containing residual fire chemicals without first cleaning/washing down the bucket.
- Avoid scooping from rivers or lakes with fixed-wing aircraft or helicopter buckets containing residual fire chemicals without first cleaning the tank, aircraft underbody or bucket.
- Consider setting up an adjacent reload site and manage the fire chemicals in portable tanks or terminate the use of chemicals for that application.
- Some fire chemicals may be irritating to skin. Wash exposed areas as soon as possible after contact.

Environmental and Wilderness Effects

Retardant use in wilderness can be inconsistent with the requirement to protect and preserve natural conditions. It may be allowed if it is the minimum necessary tactic to accomplish fire and wilderness management objectives. Retardant drops should be planned to minimize effects on natural resources and future recreation use of the area. "Fugitive" colored retardant is designed to fade over time and may be a recommended tool in sensitive areas.

Waterway and Avoidance Area Policy

- Interagency Policy for Aerial and Ground Delivery of Wildland Fire Chemicals Near Waterways and Other Avoidance Areas.

  This policy has been adopted from the 2000 and 2009 updated Guidelines for Aerial Delivery of all wildland fire chemicals, including retardant, foam and water enhancers which were established and approved by the United States Forest Service (USFS) and the Department of the Interior (DOI). It has been expanded to include additional avoidance areas for aerial delivery of fire chemicals, as designated by individual agencies, and includes additional USFS reporting requirements.

  *This policy **does not** require the helicopter or airtanker pilot in command to fly in such a way as to endanger his or her 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 (ft.) of waterways. • Additional mapped avoidance areas may be designated by individual agency. • For USFS, whenever practical, as determined by the fire incident commander, 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:
Any body of water (including lakes, rivers, streams and ponds) whether or not it contains aquatic life.

Definition of Waterway Buffer:
300 ft. distance on either side of a waterway.

Definition of Additional Mapped Avoidance Areas:
Other areas requiring additional protection outside of the 300 ft. waterway buffer. For USFS, this may include certain dry intermittent or ephemeral streams for resource protection.

Guidance for pilots:

- **Pilots will avoid all waterways and additional mapped avoidance areas designated by individual agencies.**
  To meet the 300 ft. waterway buffer zone or additional mapped avoidance areas guideline, implement the following:
  All Aircraft: When approaching a waterway or riparian vegetation visible to the pilot (to assist in identification if waterways) or other avoidance areas, the pilot shall terminate application of wildland fire chemical approximately 300 ft. before reaching the area. When flying over a waterway, the pilot shall not begin application of wildland fire chemical until 300 ft. after crossing the far bank or shore. The pilot shall make adjustments for airspeed and ambient conditions such as wind to avoid the application of wildland fire chemicals within the 300 ft. buffer zone.

Additional guidance to pilots for any aircraft supporting a fire on USFS lands:

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

- Prior to fire retardant application, all aerial supervision and/or pilots shall be briefed by dispatch on the locations of all TEPCS or other avoidance areas in the vicinity.
- If operationally feasible, pilots or the aerial supervision shall make a 'dry run' over the intended application area to identify avoidance areas and waterways in the vicinity of the wildland fire.
- Pilots should be provided avoidance area maps and information at all briefings (if not dispatched from one geographic area/unit and delivering to another geographic area).

Exceptions for USDA Forest Service:

- Deviations from the policy are allowed only for the protection of life or safety (public and firefighter).

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 in order to minimize placement of wildland fire chemical in the waterway (e.g., 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 chemical 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 chemical occurs or anyone believes it may have been introduced within waterway, waterway buffered areas or other mapped avoidance areas, the following is required as appropriate:
  - they should inform their 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; and
  - 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 wildland fire chemicals Web site at: http://www.fs.fed.us/rm/fire/wfcs and fire retardant site at: http://www.fs.fed.us/fire/retardant/. The USFS has additional reporting requirements for threatened, endangered, proposed, candidate 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) and the 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 at the same website listed above.

Endangered Species Act (ESA) Emergency Consultation

The USFS has completed consultation with regulatory agencies (FWS and NOAA) for aerial delivery of fire retardant (only) on National Forest System lands; please refer to the USFS fire retardant site at http://www.fs.fed.us/fire/retardant/ for additional information and re-initiation of consultation requirements.

The following provisions are guidance for complying with the emergency section 7 consultation procedures of the ESA for wildland fire chemicals. These provisions do not alter or diminish an action agency's responsibilities under the ESA.

Where Threatened and Endangered (T&E) species or their habitats are potentially affected by application of wildland fire chemicals, the following additional procedures apply and shall be documented in initial or subsequent fire reports.

As soon as practicable after application of wildland fire chemical near waterways or other avoidance area as designated by agency, determine whether the application has caused any adverse effects to a T&E species or their habitat. This can be accomplished by the following:

- Ground application of wildland fire chemical outside a waterway is presumed to avoid adverse effects to aquatic species and no further consultation for aquatic species is necessary.
- Aerial application of wildland fire chemical outside 300 ft. of a waterway is presumed to avoid adverse effects to aquatic species and no further consultation for aquatic species is necessary.
- Aerial application of wildland fire chemical within 300 ft. of a waterway requires that the unit administrator determine whether there have been any adverse effects to T&E species within the waterway. If no adverse effects to aquatic T&E species or their habitats, no additional requirement to consult on aquatic species with Fish and Wildlife Service (FWS) or National Marine Fisheries Service (NMFS) is required.
- Application of wildland fire chemical within other avoidance areas as designated by agency requires the agency administrator to determine whether there have been any adverse effects to T&E species. If there are no adverse effects to species or their habitats there is no additional requirement to consult with FWS or NMFS.

If the action agency determines that there were adverse effects on T&E 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 7 – Aerial Supervision Mission Procedures

Aerial Supervision operations are conducted in demanding flight conditions in a high workload/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 supervision specialists as well as unique guidance for Lead, ATCO, ASM, ATGS, and HLCO personnel.

The actions listed below pertain to all modes of aerial supervision (Lead, ATCO, ASM, ATGS, and HLCO). Methods for performing these actions differ between disciplines and are often refined as flight crew relationships develop.

Pre-Mission Procedures

Pilot Qualification Card & Aircraft Data Card

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

Flight & Duty Limitations

Determine when pilot's duty day began and if sufficient flight/duty time is remaining. If not, order a relief pilot.

Aircraft Maintenance

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

Aircraft Preparation

Pilot Preflight Responsibilities – Include but not limited to:

- Aircraft preflight inspection.
- Calculate weight and balance of passengers and equipment.
- Fueling: Discuss fuel requirements and limitations for mission with ATGS. Ensure proper fueling.
- Possess/wear approved personal protective equipment.
- File a flight plan as needed.
- Obtain a TFR and weather briefing.

ATGS/ATS Preflight Responsibilities

- Inspect communications system. Install NIFC radio package if required.
- Program VHF-FM tactical frequencies in radio (coordinate with pilot).
- Perform a radio check.
- Load air tactical equipment.
- Assist pilot as requested with crew duties.

Procurement Agreements

The aerial supervisor should be familiar with the basic terms of the procurement agreement/contract.

Obtain a Mission Briefing

Whether the air tactical mission is initial attack or a project incident, all types of aerial supervision personnel must obtain pertinent incident information. Dispatch centers must provide an **Aircraft Dispatch Form**.

Initial Attack Briefings

The following information can be recorded on a mission record or similar form:

- Incident name or number
- Agency responsible
- Incident location – legal location, latitude/longitude and VOR
- Frequencies and tones: Double check operating mode (N,W,D) and tones
- Flight following
- Air-to-Ground
- Air-to-Air (FM and/or AM)
- Contacts: ground and air
- Air resources assigned or to be assigned, Estimated Time Enroute (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, fax or messenger. A copy of the Incident Action Plan (IAP) is essential. Aerial supervision personnel may have to seek some of this information:

- Incident objectives by division
- 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/model and identification
- Incident Radio Communication Plan (ICS 205) or list of frequencies
- Incident Map
- Fire Behavior Report and local weather
- Air resource availability/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

Pre-Takeoff Responsibilities

Pilot Pre-Takeoff Responsibilities

- Complete the appropriate aircraft checklists.
- Complete preflight including passenger safety briefing.
- Complete Mission Checklist (appendix C) with aerial supervisor.
- Confirm fuel supply.
- Obtain route clearances through Special Use Airspace as required.
- Program GPS to incident location.

ATGS/ATS Responsibilities

- Obtain, record, and set local altimeter setting (from pilot or airport advisory).
- Program radios (AM/FM) – Check with pilot before programming the AM.
- Confirm fuel supply and flight time available for mission.
- Check with dispatch regarding status of military aviation operations (Restricted, MOA's, MTR's) and Temporary Flight Restrictions.
- Perform start, taxi, and pre-takeoff checklists**.**

Enroute Procedures

After Take Off

- Record take off time (takeoff roll).
- Observe sterile cockpit protocol as previously agreed to with pilot.
- Establish Flight Following (See Appendix E for further examples):
    1. Call sign
    2. Departure location
    3. Number on board
    4. Fuel on board
    5. Estimated time enroute
    6. Destination
    7. Confirm AFF
- Notify pilot of any information or situation affecting the flight (ATGS/ATS).
- Assist pilot as requested. Be an active crewmember (ATGS/ATS).
- Complete mission checklist.

Enroute Communications

Maintain communications with dispatch and other aircraft concerning:

- Incident air resource updates.
- Status of special use airspace (TFR, restricted, etc.).
- 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 when you arrive on scene.**

Fire Traffic Area (FTA) Entry Procedures

12 nautical miles 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. See FTA entry appendix D.

Scenario 1: Aerial Supervision is on scene

- Notify the dispatch center of your position.
- Change to incident frequencies.
- Give 12-mile radio call to aerial supervision. Give your location and altitude.
- Obtain clearance into FTA by getting:
  - Altimeter setting
  - FTA Entry Altitude
  - Altitude of aerial supervision
  - Altitudes of other aircraft
- Enter the incident airspace, as briefed.
- Watch for other aircraft and call out a distance and clock reference when you spot the on scene aerial supervision.
- Receive transition briefing and confirm positive handoff of aerial supervision responsibilities.
- Outgoing aerial supervision will notify dispatch and incoming aerial supervision will notify IC/ground personnel and confirm objectives and priorities.

Scenario 2: Aerial supervision is not on scene, but other aircraft are

- Notify dispatch of your position.
- Change to incident frequencies.
- Give 12-mile blind radio call on Victor (AM). Give your location, altitude, and intentions. An on scene aircraft should respond on Victor.
- Obtain clearance into FTA by getting:
  - Altimeter setting
  - FTA Entry Altitude
  - Altitudes and locations of other aircraft on scene
- Enter the incident airspace, as briefed with on scene aircraft.
- Watch for other aircraft and call out a distance and clock reference when you spot the on scene aircraft.
- Get status of all on scene aircraft (location, mission type, etc.)
- Call IC and get objectives and priorities.
- Notify dispatch you on scene and now the incident aerial supervision.

Scenario 3: There are no aircraft on scene

- Give 12-mile blind radio call to aerial supervision on Victor (AM). Give your location, altitude, and intentions. See Appendix E.
- Call the IC/ground personnel on the assigned FM air-to-ground frequency and verify no other aircraft are on scene.
- Proceed to the incident. Stay at least 2,500' AGL and watch for other aircraft.
- Get center point and record size up information.
- Call dispatch, notify you are the on scene aerial supervision and provide size-up.

- Call the IC/ground forces and establish objectives and priorities.

Entering Incident Airspace - ATGS fixed-wing enter the airspace in a right hand pattern at 2,500 feet AGL unless the situation dictates a different altitude (smoke/terrain), Leadplane enter in a left pattern, and ASM or HLCO enter in either, depending on the situation.

Aerial Supervisor Arriving on Scene Responsibilities

The Aerial Supervisor must:

- Watch for aircraft and make visual/verbal contact with each one.
- Determine ground elevation to establish FTA altitudes for incoming aircraft including helicopters, airtankers, lead/ASM, smokejumpers, relief aerial supervision, and media ("the stack").
- Determine flight hazards – Power lines, antennas, snags, terrain, thunder storm activity, excessive wind, poor visibility, airspace conflicts, etc.
- Confirm incident objectives and priorities with the IC/ground personnel.

Standard Briefings

All aircraft will receive a briefing and clearance into the FTA. Briefings typically occur in three phases: 1) initial, 2) tactical, and 3) departure. See Appendix E for more information on standard briefings.

Initial Briefing

Clearance information

- Altimeter setting
- Clearance Altitude

Aircraft in FTA

- ATGS altitude
- Other aircraft altitudes

Mission instructions

- Coverage Level
- Load portion
- Number in pattern
- Location needed
- Contact and frequency

Hazards

- Enroute hazards

Tactical briefing

This briefing occurs when the incoming aircraft has the drop/mission area in sight.

Define objectives

- Identify specific hazards
- Target description
- Low-level clearance
- Ground clearance

- Exit routes

Departure Briefing

Drop/mission evaluation

- Start
- Line
- End

Return Instructions

- Fuel/Load and Return/Hold
- Location
- Special instructions

Egress Altitude and Direction

- Ensure departing aircraft have a clear exit path from their area of operation.

Dispatch

- Notify dispatch of reload instructions (load and return, hold, released, etc).

Target Description

- Direct aviation resources to mission areas and targets.
- Concise messages using standard terminology expedite the task and increase safety.
- A standard target description includes the following:
  - Target location
  - Drop objectives (intent of drop)
  - Type of drop/coverage level
  - Hazards
  - Clearance to drop

Methods to describe targets

- GPS reference points – in limited visibility (inversions), lat & long 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) 27 datum and a degrees, minutes, seconds format. The use of different datums and formats may result in misinterpreting the location of a specific target. Ensure that the target location is confirmed with ground personnel.
- Fire anatomy: Left and right flank, head, heel (tail in AK), etc.
- Geographic features: Ridges, saddles, spur ridges, lakes, streams, etc.
- Cardinal directions: Specify true or magnetic. Be exact! Often directions are generalized and create confusion.
- Specific activity: Dozer working, firing operation, parked vehicles, previous drop, etc.
- Elevation: Specify above sea level (MSL) or above ground level (AGL).
- Incident features: Helibase, helispots, fireline, and division breaks, etc.
- Standard terminology: Standard terms are in the glossary.

Guiding Aircraft to Targets

- Clock directions, left or right, etc.

- Signal mirrors, ground panels, lights, etc.
- Have an on scene aircraft lead new aircraft to the target area.
- Discuss target locations when the other aircraft is in position to observe.

Aircraft Separation

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

Common Principles of Aircraft Separation

- Use standard aviation 'see and avoid' visual flight rules.
- Have access to the appropriate air-to-air frequency for position reporting.
- Adhere to Fire Traffic Area (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
  - Visually tracking aircraft as needed
  - Giving specific directions to pilots as needed
  - Advising pilots on the location and heading of other aircraft

Note: The coordinates of the incident must be verified, updated as needed, and communicated to Dispatch to ensure that inbound incident aircraft can determine the appropriate points at which to initiate initial contact and/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. **1,000 feet is preferred and should be used whenever possible**.
- Assigning block altitudes (with vertical range up to 500 feet) to orbiting fixed-wing is preferred in windy or active thermal conditions.
  - Assign helicopters a hard ceiling (i.e.: 4,500' and below). **Do not assign them 500' AGL.**
  - Vertical stacking airtankers is discouraged. Utilize a racetrack pattern if multiple airtankers (of any type) are on scene.
  - It's common practice to put media helicopters above the ATGS in order to keep them away from firefighting aircraft.

- Standard operational altitudes and patterns are:

Table 6. Standard Operational Altitudes and Patterns

Mission	AGL (feet)	Normal Pattern
Media	As assigned	Right or left
ATGS – Fixed-Wing	2000 to 2500	Right
ATGS – Helicopter	500 to 2000	Right or left
Airtanker Orbit	1000 to 1500	Left – outside to observe
Airtanker Maneuvering	150 to 1000	Left
Leadplane	150 to 1000	Left
Helicopters	0 to 500 (hard ceiling)	Left or right
Smokejumper Ram-Air Chute	3000	Left
Smokejumper Round Chute	1500	Left
Paracargo	150 to 1500	Left
Streamers	1500	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, i.e. not hindered by terrain.
  - 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 accessible for pilots to give position reports.
  - Geographic references, such as a ridges or a river, can be used to separate aircraft provided aircraft maintain assigned flight patterns.
  - No-fly zones must be established to ensure safe separation when simultaneous missions at the same elevation are within close proximity.
  - Below ridges: For operations separated by a ridge, a "no-fly zone" 500 feet vertically below the ridge top can be established to ensure separation.
  - Near geographic dividing lines: If simultaneous operations near the dividing line are in conflict, a horizontal "no-fly zone" must be established or missions must be sequenced to ensure adequate separation.

Incident Entry and Exit Corridors

Aerial supervision shall determine incident entry/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 (refer to Incident Ingress/Egress discussion above).

Initial Points, Check Points and Holding Areas

The aerial supervisor assigns incoming aircraft to non-conflicting airspaces, or holding areas, as needed. Coordinates or a geographic reference work best.

Initial Point: A fixed-wing reporting location clearly identified by the aerial supervisor. It may be a lat/long or geographic point (landmark). Initial Points (IP's) are used to route incoming resource to a known location before engaging in tactics.

- Aircraft entering Initial Points used for initial entry or holding areas into an FTA shall utilize FTA entry procedures (12-7mi. no-com rings). Contact to/with the aerial supervisor managing the IP must be established prior to entry into the IP.

Check Point: A rotor wing reporting location clearly identified by the aerial supervisor. It may be a lat/long or geographical point (landmark). Check points are used to route rotor wing aircraft to and from assignments.

- Helicopters entering a check point used for initial entry or holding areas into a fire traffic area shall utilize entry procedures (12-7mi. no-com rings). Contact to/with the aerial supervisor managing the check point must be established prior to entry into checkpoint. Helicopters using check points while transitioning an established route will announce their direction and intended destination via blind call on the appropriate air tactical frequency (Rotor VHF-AM or Air tactics).

Holding areas: Multiple aircraft can be held near an incident in the same holding area. More than one holding area may be used. Considerations include:

- Pilots must be aware of other aircraft in the 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. Usually a "race track" pattern with one tanker following the other at the same altitude 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

Aircraft may be sequenced into the same area provided each aircraft can complete its mission and exit the area before the next aircraft enters the area. Sequencing requires close supervision. **Caution:** Consider wake turbulence when sequencing any type of aircraft.

S**equencing Airtankers and Helicopters –** Helicopters can be held at a safe distance from drop site until an airtanker has completed its drop.

Sequencing Airtankers and Paracargo – Stage aircraft 180^0 apart in the same flight pattern so flights over the target area are controlled by position in orbit.

Interval Dispatching

To reduce the problem of too many airtankers over an incident at the same time, ask dispatch or the ATB to launch airtankers at intervals (usually 10 to 15 minutes).

Virtual Fences and Check Points

Effective for maintaining air traffic control with minimal radio traffic on the Air-to-Air frequency.

Pilots are instructed to report their location and destination "in the blind" when crossing check points. Pilots may be required to report arrival at a virtual fence and wait for clearance from ATGS before proceeding. Geographic locations that make effective check points and virtual fences include:

- Roads

- Power lines
- Ridges
- Lakes

Helicopter Routes

Helicopter routes are established for repetitive missions from helibase to helispots or sling points, from dipsites to targets, etc. For safety, efficiency and monitoring, the ATGS, in consultation with the helibase manager and/or helicopter pilots, will ensure flight routes and communications procedures have been established and are known:

Well Defined Routes – 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, etc.

Air-to-Air Communications – Pilots must have ready access to the Air-to-Air frequency in order to maintain separation. If needed, separate Air-to-Air frequencies should be established for helicopters and airtankers. The original air-to-air frequency should be retained for airtankers.

Helicopter Daisy Chains

Two or more helicopters can be assigned to the same targets and dipsites for repeated water drops. The ATGS, in consultation with helicopter pilots, will establish a "daisy-chain" flight route for these operations.

Helicopter Recon Flights

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

- Schedule recon flights during slow periods, i.e., when airtankers are loading.
- Assign a specific route for the recon, ex. clockwise around and 100 yards outside the incident perimeter.
- Establish Check Points, i.e. division breaks, helispots, drainages, etc.

Intersecting Routes

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

Non-Standard Patterns

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

The mission pilot, LEAD, or HLCO shall advise ATGS of situation and request a deviation from standard procedures. The ATGS will advise other aircraft before granting the request.

Coordination Between Types of Aerial Supervisors

Each incident is unique and circumstances dictate that workload sharing between Lead, ATGS, HLCO and ASM as their responsibilities overlap in several areas. By prior agreement and after receiving a good briefing, a positive working relationship can be established.

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

Airtanker Mission Sequence between ATGS and Lead/ASM

1. ATGS and ground operations jointly determine tactical objectives.
2. ATGS briefs Lead/ASM on next target, coverage level, etc.
3. Airtanker makes 12 mile check in with ATGS or Lead.
4. If the airtanker checks in with ATGS, ATGS will brief airtanker or pass on to Lead/ASM (preferred).
5. Lead/ASM briefs airtanker on target, coverage level, etc.
6. ATGS clears conflicting air resources from the airspace and gives verbal clearance to Lead/ASM for low level operations. The ATGS may also elect to hand off conflicting air resources to Lead/ASM in order to reduce radio traffic.
7. ATGS clears ground personnel from target area.
8. ATGS will maintain radio silence on Air-to-Air while Lead/ASM and airtanker are working, particularly when on final approach or exiting the drop area unless the drop needs to be called off. If incoming airtankers reporting 12 miles out and are in conflict with ongoing operations, than a separate airtanker briefing frequency for the Leadplane and airtanker in tow should be established. This can be VHF-AM or FM.
9. Lead/ASM will do low level recon to determine hazards, targets, elevations, location of people, equipment, facilities, safe patterns and exit routes, etc.
10. Lead/ASM briefs airtanker on objectives, flight route, coverage level, drift potential and hazards.
11. Lead/ASM may make a dry run with airtanker on the intended target.
12. ATGS confirms ground personnel are clear of target area.
13. Airtanker makes drop(s). Airtanker may or may not require a lead.
14. ATGS pilot positions aircraft to monitor and evaluate drop.
15. ATGS evaluates drop and gets ground feedback. Leadplane may also be able to evaluate drop. Evaluation includes accuracy, coverage level, coverage uniformity, etc. Evaluation may reveal need to adjust to left or right. These adjustments are expressed in wing-spans or rotor-spans, not feet or yards.
16. ATGS gives feedback to Leadplane and airtanker pilot after clear of drop area (Leadplane and airtanker may have already heard same feedback from ground).
17. Lead/ASM and airtanker make adjustments as needed on subsequent drops.
18. Lead/ASM gives airtanker reload instructions based on instruction from ATGS.
19. ATGS informs ground when clear to return to work area.
20. Airtanker informs dispatch on status – load and return or hold.

Assuming ATCO Duties

When a Lead/ASM is unavailable due to days off, arrival delays, out of flight hours, or refueling, the ATGS will assume the ATCO. The ATGS must maintain a minimum altitude of 500 ft. AGL performing ATCO duties.

Maintaining Air Tactics Continuity

Complex air operations or air operations involving a mix of air resources requires continuous supervision by an ATGS, ASM, Lead, 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/ground operations in designated areas on complex incidents.
- Stagger aircraft refueling so all aircraft are not down simultaneously.
- Stagger airtankers to maintain continuous coverage.

- Monitor flight times. Anticipate the need for a relief pilot, Leadplane or other air resource. Notify dispatcher or AOBD in a timely manner.
- Anticipate fuel needs and facilitate obtaining fueling facilities near the incident.
- Recommend activation of portable reload bases to reduce turnaround time.
- Coordinate refuel and relief needs between aerial supervisors to ensure continuity of airspace management/supervision.

Relief Guidelines

Aerial supervision is mentally demanding. Long flight hours result in mental fatigue, reduced effectiveness, and compromised safety. 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 about every 3 hours.

Diversion of Aerial Resources

Higher priority incidents require diversion of air resources. A reassignment may be given through dispatch or through IC/Operations. 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 on the following:

- Incident location
- Air and ground contacts
- Radio frequencies

Note: Tactical aviation resources may be diverted to a higher priority incident. The aerial supervisor should be advised by dispatch and modify incident tactics.

No Divert Request

Under the following situations, the IC can request through dispatch that no airtanker be diverted to other incidents when an imminent threat to life of a firefighter or civilian exists.

Coordination with Ground Personnel

- On type 1 & 2 incidents, aerial supervisors work with Air Operations, Operations, Division Supervisors, and other line personnel.
- On type 3 & 4 incidents, aerial supervisors work primarily with the IC, ground crews, and dispatch.
- Aerial supervisors provide intelligence to tactical personnel and dispatchers in order to facilitate the dissemination of valid information provided during 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 and/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

- Mark assignments based on Operations/ICs strategy, tactics, & mission priorities.

Determine TFR requirements

- Vertical and horizontal dimensions
- If needed, order through dispatcher or Air Operations Director

Check for Airspace Conflicts

- Identify MOA's, MTR's, 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 Air Drop Information to Ground Crews

- Advise personnel of impending 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 (live or de- energized?); Advise ground personnel of danger of being near power lines during drops.
- Confirm with ground if run is to be a dry or live.
- Notify ground 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 fire perimeter, blowup areas, etc.
- Assist with locating safety zones and escape routes. Final determination must be made from ground.
- Monitor weather – advises personnel of approaching fronts or thunderstorms.
- Advise personnel on adverse changes in fire behavior.
- Direct air resources, as top priority, to protect and aid in evacuation of endangered personnel.

Determine the Procedures for Ordering Tactical Aerial Resources

- The authority to order retardant and helicopter support varies between dispatch centers, land status, 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. Ensure the procedure is stated clearly in the IAP.

- On initial attack incidents, the IC makes aircraft orders. The IC may choose to delegate this to the aerial supervisor. Confirm it before ordering.

Coordination with Dispatch

Provide dispatch the following information in a timely manner:

- A fire size-up including a center point.
- Horizontal and vertical dimensions of a Temporary Flight Restriction (TFR) if needed. Remember that TFRs are based on degrees, minutes, and seconds. Dispatch centers may assist with conversion of Lat/Long.
- Airspace conflicts with civilian or military aircraft.
- The need for airtankers to load and return or hold.
- Aircraft incidents/accidents.
- Project needs for next day – number of aircraft by type, time requested, etc.
- Aerial supervision flight/duty hours used and projected needs to complete the mission.
- Request where airtankers should return over night (RON) when day's operations are completed.
- Advise on need for aircraft maintenance and projected availability for next day.
- Advise if airtanker has in flight difficulty, must abort load, and return to base.
- Advise on need for aerial supervision relief at least 2 hours before you need it.

Before Leaving the Incident

- Coordinate with the Lead, ASM, ATGS or HLCO to ensure continuity of aerial supervision.
- Notify Operations of Estimated Time of Departure (ETD), and who will supervise air operations.
- Notify air resources of ETD and whom they will report to.
- Notify the IC, Operations/Air Operations, DIVS, helibase, Lead, 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 legal daylight flight restrictions (not necessary for twin-engine aircraft).
  - Update Operations personnel on fire status.
  - Remind remaining resources of daylight restrictions.
  - Confirm with dispatch status of air resources – RON or return to home base. Inform air resources of their status.

Post Mission Procedures

- Confirm need for aerial supervision aircraft for next day and notify pilot of time, etc.
- Debrief with available air resources (ATGS pilot, airtanker pilots, HLCO, Leadplane pilot, 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 Incident Action Plan and map for next day's operation.
- Complete payment documents.
- Submit SAFECOMs as required.

- Update logbook.

Emergency Procedures

Flight Emergencies

When a flight emergency is declared, possibly as "May day, May day, May day" the aerial supervisor manages the emergency using appropriate procedures from the list below:

- Emergency is 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.
- Direct the aircraft to depart mission area and climb to a safe altitude.
- Jettison load in remote areas (or specified jettison areas) if feasible.
- If problem persists, instruct 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/rescue protocol.

Missing Aircraft and Aircraft Mishap

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

- Assign aircraft as needed to conduct search.
- Determine location. 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 own safety.
- Advise IC/Operations – be discreet about aircraft and flight crew identity.
- 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 – 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: Incident Management Teams typically have an established procedure for incidents within the incident (IWI). Obtain a briefing from Air Ops.

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Chapter 8 – Aerial Firefighting Strategy and Tactics

Principles that apply to ground operations also apply to air operations. 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 mainly tactical decisions based on objectives developed by incident command personnel. The most effective aerial tactic is anchor, flank and pinch.

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

Aerial Fire Suppression Strategies

There are three general suppression strategies:

Direct attack

Drops next to fire edge in support of ground forces.

Parallel attack

Generally parallel to and within a hundred feet of perimeter. Anticipates lateral fire spread, worker comfort/safety, and line construction rates. Multiple parallel drops can be used on unburned fuels of fast moving high intensity fires to increase line width.

Indirect attack

Pretreatment of fuels which are far removed from the main fire. Examples include safety zones, ridgelines, roads, or areas or light/sparse fuels.

Aerial Fire Suppression Tactics

In support of direct attack strategies, place drops where ground support is available and containment or extinguishment is likely. Direct attack the head when you are assured you won't be outflanked, fire behavior is low to moderate, and your initial load has a good chance of achieving the objective. Indirect and parallel attack strategies require coordination with ground personnel as to the timing of firing operations, structure protection, etc. Consider the following patterns and considerations.

Box and "V" Pattern (Relatively flat terrain**)**

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 are started 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 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.

General Tactical Considerations

Tactical plans are based on the chosen strategy and a working knowledge of the following principles. The following will help in developing and carrying out an aerial tactical plan.

Simplicity & Flexibility

Stick to a few basic tactical objectives. Be ready to change priorities as needed to achieve strategic objectives.

Retardant Versus Water or Foam

Unless there are environmental constraints, retardant application may be preferred compared to the use of water or foam. If long-term retardant is required, don't rely on water or foam – they normally require immediate (0-30 minute) follow up.

Proper Coverage Level

Use the proper coverage level for the fuel types.

Dense Canopies

Multiple drops may be required to penetrate canopies and treat surface fuels with proper coverage level.

Sustained Attack

To effectively lay a retardant line under normal fire conditions, continuous drops supported by ground forces are required. Calculate turnaround time and order enough aircraft to maintain a sustained attack.

Use Down Sun

Avoid flight routes directly into sun on the horizon.

Blow ups/Flare-ups

Direct or parallel attack is usually ineffective. Shut down operations until conditions are more favorable or concentrate on pretreatment targets.

Target Priorities

Retardant use is usually prioritized in the following order:

1. Human Safety
2. Structure Protection
3. Natural Resources

Portable Retardant Plants

Where long turnaround times or lack of large airtankers will not provide a sustained attack, consider ordering a portable retardant plant and type I /II helicopters or SEATs. SEATs typically respond with a support vehicle which has suppressant/retardant mixing/loading capabilities. Within 24-36 hours portable plants can be delivered and set up on or near an incident. Some operators can provide a module consisting of a type I helicopter, portable plant, retardant, and mixing crew. Not all retardants are approved for fixed tank helicopters. Consult the qualified products list for approved retardants.

Staggered Duty Hours

Stagger aircraft duty hours to provide availability during early morning through end of daylight.

Early Morning Drops

Often the most effective. Don't wait until it's too late to order retardant. Use drops to prevent problems, not to cure them!

Wind Drift

An increase in coverage level may be required to reduce the effects of drift. Caution – Maintain safe drop height.

Critical Targets

On initial attack incidents, identify targets for attaining quick containment and drop on these first.

Anchor Points

Work from an anchor. Reestablish the anchor if it is lost. Terrain may dictate flights are flown toward, rather than from, an anchor point.

Maximize Line Production by:

- Keeping lines relatively straight; minimize angles
- Taking advantage of natural barriers and lighter fuels
- Allowing pilot to select the best and safest flight route

Gaps in Line

Observe for gaps in retardant, foam or water line. Pick up gaps with subsequent drops or with ground resources or SEATs.

Plan for Extending and Intersecting

Plan current drops so they can be extended or intersected effectively by future drops.

Anticipate Spot Fires

Generally downwind of smoke columns.

Control Fire Intensity

With direct drops on or next to fuels.

Effective only when immediately followed up by ground forces.

Reduce Spotting Potential

With pretreatment drops on fuel beds.

Maintain Honest Evaluations

To assist pilots with making corrections.

Use Correct Resources:

Match resources to correct tactical objectives.

Retardant Drops near Water Resources

Agency policy and Unit level tactical plans may restrict the use of airtankers and helicopters near water resources. When drops are planned in sensitive areas, the ATGS should contact the local unit or a Resource Advisor for applicable policy restrictions, (e.g., Interagency policy prohibits dropping retardant within 300 feet of stream courses).

- Locate and map water resources within the tactical air operations area.

- Determine safe drop distances.
- Monitor wind conditions and drift and adjust restrictions as necessary.
- Use helicopters to maximize drop accuracy.

Initial Attack and Multiple Fire Operations

Assuming Control of Air Operations in Progress

The aerial supervisor often arrives after other air resources have arrived. Before assuming control the aerial supervisor should:

- Monitor air traffic and operation's frequencies while inbound to the incident.
- Contact air and ground resources to determine status of air resources on-site.
- Allow safe operations in progress to continue temporarily.
- Make assessment of the incident.
- Brief the IC of assessment and make recommendations and/or request IC's strategy and tactics and mission priorities. The experience level of an initial attack IC determines the ATGS role.
- Establish contact with key ground operations personnel.

Initial Attack Mission Priorities

Often during initial attack several aircraft arrive at the same time. Each resource has different altitude, route, and time requirements. While some missions can be done simultaneously, the confined airspace usually requires priorities be established based on:

Time – Typical time requirements for common missions are:

- Bucket drop: 1-2 minutes
- Helitack: 3-5 minutes
- Helicopter rappel: 20 minutes
- Airtanker: 7-15 minutes (one vs. multiple drops)
- Smokejumper: 30 minutes. (depends on number of jumpers/cargo to be dropped)

General Considerations

- Which resources are ready?
- Can any resources be held or parked?
- Can any missions be done simultaneously?
- Can any mission be done in stages?
- Conditions that if delayed may preclude mission completion, i.e. fuel remaining, pilot duty/flight time remaining.

Normal Priority – Considering all factors, the normal priority is:

- Helicopter bucket/retardant drop
- Airtanker
- Helitack/rappel
- Smokejumper

Initial Attack Responsibilities with no IC – The ATGS, in consultation with dispatch, has the following responsibilities on initial attack 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 predicted or active lightning storms when multiple fire starts are likely to assist with:

Fire detection – Coordinates, legal descriptions, VOR and distance, etc.

Incident priorities are based on the following:

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

Determine Access – Roads, trails, distance, and time requirements.

Recommend Initial Attack Resources – Based on resource capability, mode of access, probable availability and response time.

- **Develop Initial Attack 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. One type II or II airtanker can make holding drops on three or four small fires. 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 in close to each other before moving to fires some distance away.
- Direct retardant drops. General covering of the entire fire is recommended when controlling both fire spread and fire intensity. While drops covering the fire reduce fire intensity, they also make burnout operations difficult if not impossible.
- Monitor status of fires. Change priorities as necessary.

Wildland Urban Interface

Airtankers and helicopters can be effective on urban interface incidents. If improperly managed they can be a serious hazard to the public and a liability to the responsible agency. Consider the following in the urban interface:

Policy and Regulations

Fires in the urban interface are considered to be in "congested areas." Refer to Chapter 4 for more detail.

- **Order a Lead/ASM –** As required under FAR 91.119 – USDA Grant of Exemption 392. Refer to Chapter 4 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 extreme risk.

Effectiveness of Resources

As urbanization increases tactical effectiveness decreases. It becomes more critical that airtanker and helicopter drops 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.
- Provided there is an adequate water source, the type 1 helicopter, with its maneuverability, drop accuracy, and quick turnaround time, is the best resource in the urban interface.
- Drops are generally not effective on structures that are burning beyond the initial start phase or if the fire is inside the structure.

Urban Interface Tactical Planning Principles

Apply the following principles in developing the tactical plan and making air resource assignments:

- 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
- Request 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.

- Recommend location of portable retardant or water dipsites.
- Use airtankers in areas where visibility, hazards, flight routes, crowd control and target selection ensure reasonable effectiveness and acceptable risk.
- Use helicopters on targets requiring more maneuverability and accuracy under conditions that would preclude safe and effective airtanker operations.
- When possible, avoid holding patterns with airtankers over populated areas.

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Chapter 9 – Tactical Aircraft Operations

Low-Level Operations (Leadplane Pilot/ASM)

Low-level flight operations involve fixed-wing aircraft flying below 500' above ground level (AGL). These missions are typically performed in order to ensure 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 Lead/ASM crew member to ensure safe flight operations. The Lead/ASM conducts these operations in the following manner:

Lead/ASM Tactical Flight Checklists

The flight crew completes tactical checklist before conducting low level flight.

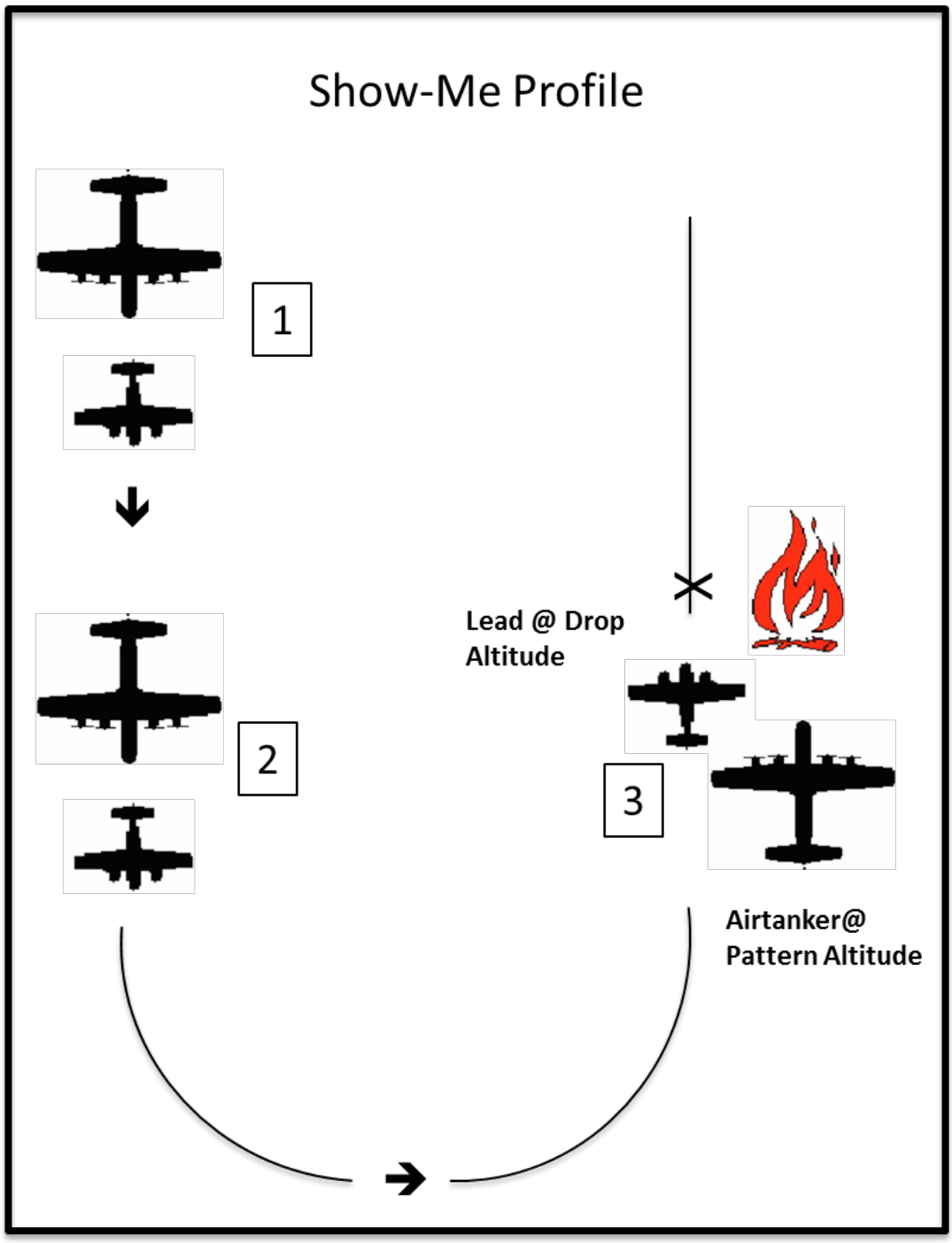
- High Level Reconnaissance
  - A high recon pass is executed prior to descending to low level.
  - Look for aircraft over the incident including media and nonparticipating aircraft.
  - Analyze the terrain. Identify potential approach and departure paths while identifying prominent target features.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

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.

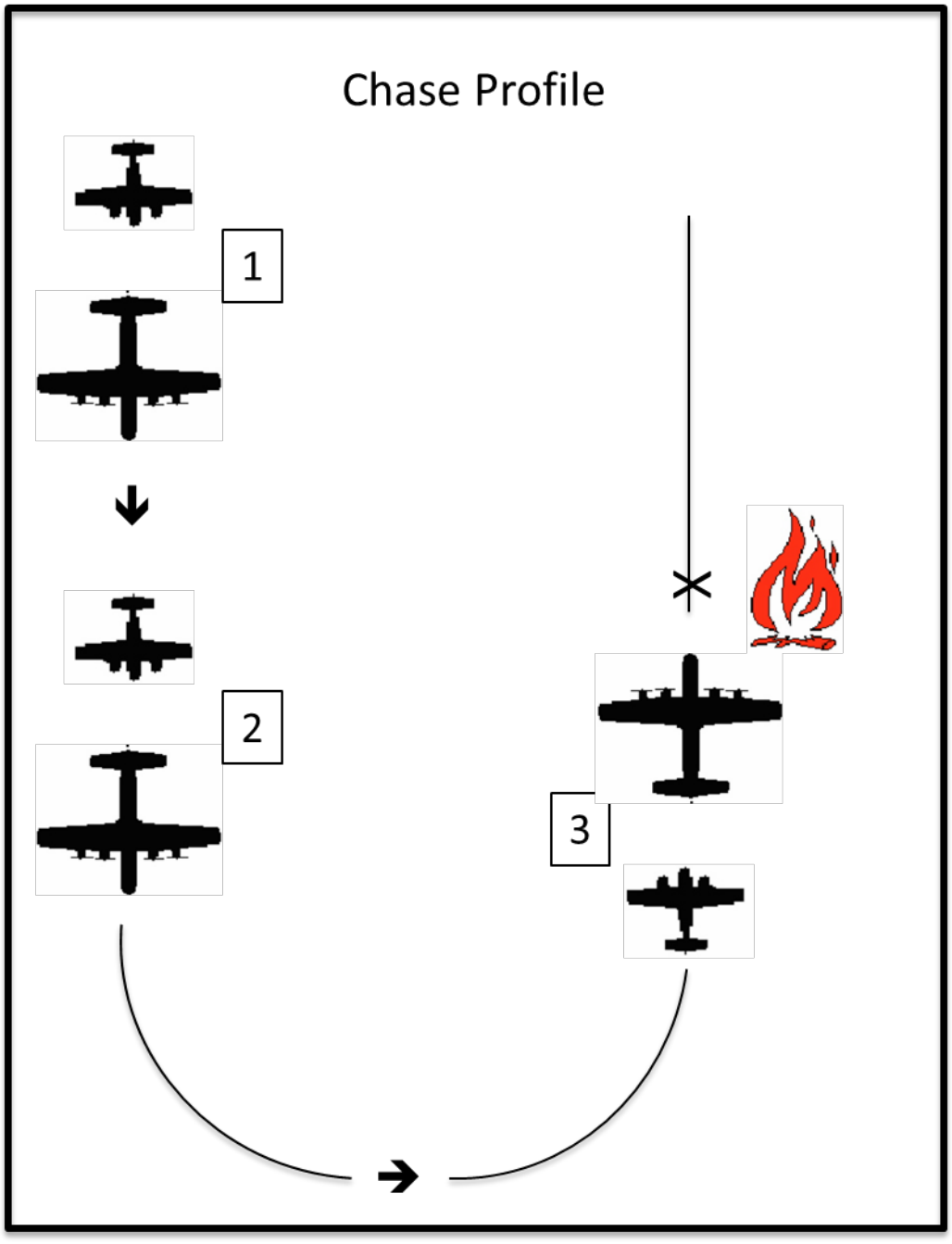
The pilot begins the run when the airtanker crew can visually identify the aircraft, hazards, line, start and exit point of the drop.

Figure 3. Show-Me Profile



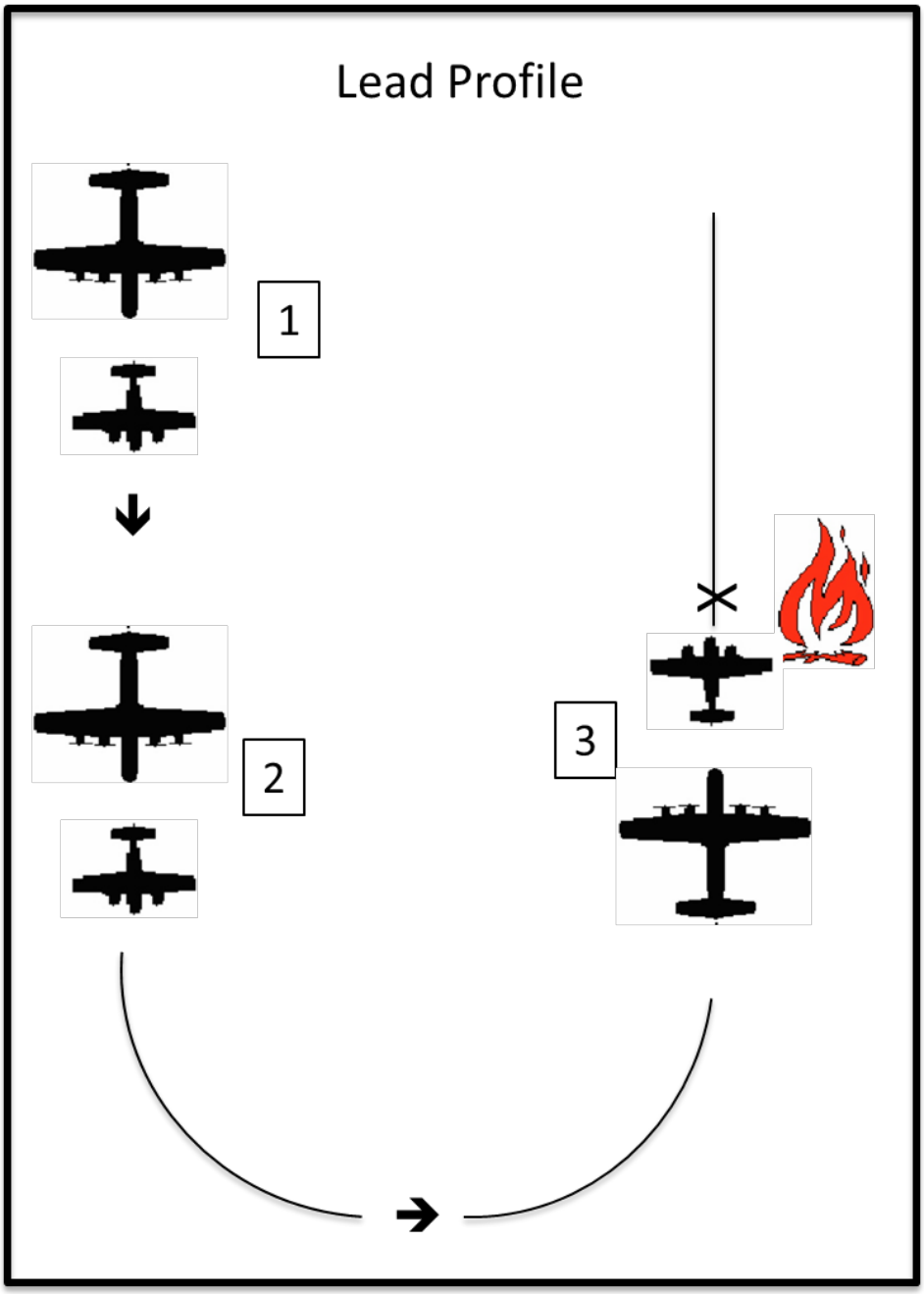
Chase Position Profile – The Chase Position Profile is an observation position in trail of and above the airtanker at a position of 5 to 7 o'clock. The Chase Position Profile is used to verbally confirm or adjust the position of the airtanker when on final, and to evaluate the drop.

Figure 4. Chase Position Profile



Lead Profile – The Lead profile is a low level (below 500' AGL) airtanker drop pattern, made with the Leadplane approximately 1/4 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 5. Lead Profile



Airtanker Briefings

- See Appendix E and Chapter 7

Maneuvering

When leading airtankers, shallow to medium banked turns no greater than 30 degrees should be used. Extreme vigilance is required when operating beyond a 30 degree bank angle. When bank angles exceed or may exceed 30 degrees, the lead aircraft shall notify and brief the tanker. In any case, bank angle should not exceed 45 degrees. Inform the airtanker pilot ahead of time if turns in excess of 30 degrees are anticipated. 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 Leadplane operations shall not be flown below best single-engine rate of climb airspeed (Vyse) or minimum controllable airspeed one engine inoperative (Vmca). Refer to agency specific aircraft flight operations handbooks or pilot operating handbooks.

Approach and Descent to the Target – The run should be downhill, down canyon, down sun with the greatest degree of safety in mind. Maintain the agreed upon airspeed in order to sustain approximately 1/4 mile separation between the Leadplane 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 "show-me" is to fly the retardant line you want on the ground. The standard "live run" is to fly the expected drift line.

Drop Height

- The minimum is 200 feet above the top of the vegetation for VLAT**.**
- The minimum is 150 feet above the top of the vegetation for LAT.
- The minimum SEATs drop at 60 feet.
- 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.

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 or pull-up maneuver (be cognizant of the airtankers position at all times). Exiting is a critical maneuver at low altitude. Take every precaution to ensure that airspeed and aircraft attitude are within safe limits. The pull-up maneuver need not be greater than what is required to comfortably clear all obstacles and to provide the Leadplane pilot with a view of the drop for evaluation (Safety-of-flight has priority over drop evaluation). Airspeed shall be no less than 130 KIAS and a load factor no greater than 1.5 positive G's when exiting the target.

Emergency Overrun Procedures – In the event of an imminent overrun of the Leadplane 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 Leadplane on the right.
- Left or right turn flight paths: Pass the Leadplane outside the turn.
- Terrain or visibility limitations: When terrain or visibility prevent utilizing 1or 2 above,

pass above the Leadplane.

Airtanker Operations

Airtanker Tactical Considerations

Airtanker advantages – Often reserved for initial attack because:

- High cruise speed: Airtankers fly fast and arrive at most fires long before helicopters can be dispatched. Airtankers may be the only aerial resource available if an incident has no dipsites or portable mixing plant options.
- Long range: High speeds and fuel loads allow airtankers to cover broad geographical areas. They often respond to multiple incidents on one flight.

Permanent Reload Bases

Airtankers are loaded at permanent bases. Portable bases able to serve all types of airtankers may be set up for special situations.

Factors Influencing Drop Effectiveness

A number of factors affect drop accuracy, line width and length, and coverage level required for particular fuel model and fire intensity. These factors include:

Pilot Skill – Ability to make accurate drops.

Aircraft Make and Model – Each aircraft make and model has advantages and disadvantages in different operating environments. Performance 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, increase pattern momentum, and increase low coverage length.

Diving vs. Climbing – A diving maneuver tends to shorten the pattern and increase coverage levels. Conversely, a rising maneuver tends to toss or loft retardant and elongate the pattern.

Wind – The effect of wind is to deflect retardant and greatly increase the pattern's fringe area. The effectiveness of retardant/water drops should be closely evaluated when wind velocities reach 15 kts. Retardant drops are generally not effective in winds 25 kts or greater.

- 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.

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. Long-term 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 .5 to greater than 8. 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 7. 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, Shortneedle Closed Conifer, Summer Hardwood
	E,P,U	9	Longneedle Conifer, Fall Hardwood
2 or 3	T	2	Sagebrush with Grass
3	N	3	Sawgrass
	F	5	Intermediate Brush (green)
	K	11	Light Slash
4	G	10	Shortneedle Conifer (heavy dead litter)
6	O	4	Southern Rough
	F,Q	6	Intermed. Brush (cured), Black Spruce
Greater Than 6	B,O	4	California Mixed Chaparral; High Pocosin
	J	12	Medium Slash
	I	13	Heavy Slash

Airtanker Drop Patterns

By opening one or more doors simultaneously or in quick succession, a variety of patterns and coverage levels can be achieved. The ATGS must know the number of doors that can be dropped singly or in combination, various drop pattern options, and the coverage level required for various fuel models.

Salvo Drop – One or more doors are opened simultaneously. Generally used on small targets such as spot fires or targets requiring heavy coverage levels. Rarely is a full salvo ordered.

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 Table

This chart displays line production by coverage level and gallons dropped for drops made at the recommended drop height and airspeed. The chart should be used as a general guide and will need to be adjusted for specific tank systems, airtanker make and model and the actual drop conditions.

Table 8. Heavy Airtanker Line Length Production Chart (feet)

Volume Dropped (Gallons)	Coverage Level 0.5	Coverage Level 1	Coverage Level 2	Coverage Level 3	Coverage Level 4	Coverage Level 6	Coverage Level 8
800	2,246	1,114	526	311	189	38	0
1,000	2,337	1,202	607	384	255	90	0
1,200	2,429	1,289	687	458	321	142	9
1,400	2,520	1,377	768	531	387	194	46
1,600	2,611	1,465	848	604	454	245	84
1,800	2,702	1,552	929	678	520	297	121
2,000	2,794	1,640	1,009	751	586	349	158
2,200	2,885	1,728	1,090	824	652	400	196
2,400	2,976	1,815	1,170	897	718	452	233
2,600	3,068	1,903	1,251	971	784	504	270
2,800	3,159	1,991	1,331	1,044	850	556	308
3,000	3,250	2,078	1,411	1,117	916	607	345

Ten Principles of Retardant Application

- Determine the strategy; direct 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 always; 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 only when ground support is available or extinguishment is feasible.

- Plan drops so that they can be extended or intersected effectively.
- Monitor retardant effectiveness and adjust its use according.

SEAT Operational Principles

For additional information see Single-Engine Airtanker Operations Guide:

http://www.fs.fed.us/fire/aviation/av_library/Revision_8_EHE%20Source%20List%20(03-01-14).pdf

- Minimum SEAT drop height is 60' above vegetation.
- When collocated with aerial supervision utilize both resources for initial attack.
- SEATs are most effective on small, emerging incidents.
- Reduce turnaround times by setting up a remote reload base as close as possible to the incident.
- Efficiency is maximized when time spent over the target is minimized. Leadplanes typically utilize the show-me and chase profiles.
- Integrate SEATs with other resources – Use SEATs in conjunction with helicopters and heavy tankers.
- Work SEATs in groups to minimize line length.
- 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:
  - **A**pproach
  - **S**peed
  - **H**eight
  - **E**xit

Airtanker Flight Routes

- **Route Safety** – Approaches and exits must allow for a level or downhill flight maneuver.
- **Visibility** – Poor visibility from smoke or sun may preclude using the safest and most effective route. Alternate routes may be acceptable, but may result in less effective drops.

Helicopter and Helitanker Operations

Helicopter Tactical Considerations

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 I helicopter with a 3-minute turnaround can deliver upwards of 45,000 gallons per hour (Boeing 234, S-64). By comparison a type I airtanker will typically deliver 2000 to 3000 gallons per hour based on a one-hour turn- around.
  - Low-Speed and Drop Accuracy
  - The ability to do hover or low speed drops makes helicopters very accurate if flown by an experienced pilot. Helicopters are an excellent choice for; targets in confined airspaces in steep and dissected terrain, small targets where airtanker drops may be wasted by covering a larger than required area, to treat gaps in airtankers line, in low visibility situations (smoke, low ceiling) where airtankers cannot fly, near water resources to minimize the potential for water contamination, and in the urban

interface environment where accuracy is paramount. Caution – Drops on steep slopes may dislodge rocks onto crews below.

Dipsites

- For an effective helicopter operation, good water sources are required. Sources can include wide mouth portable tanks. The ATGS should inventory suitable dipsites. Following are considerations:
  - Approaches should be into wind. Determine if wind direction is the same at hover level as it is at the dipsite 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 and/or dispatch for specifics.
  - Approach, departure, and dipsite 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 dipsites and/or any other resource contamination concerns (i.e. 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 dipsite managers (when available) to provide an added margin of safety at established dipsites.

Longline Bucket Operations

- Effective for dipping out of close quarters (ex. dipsite surrounded by tall timber)
- Reduce 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; assign Division frequencies for direct communications between ground contact and helicopters.

Allow Pilots to Select Drop Approach

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

Helicopter Utilization by Type

- Type II and III helicopters can work together but do not integrate Type I helicopters unless all pilots involved are comfortable with pattern and separation.
- Type I and II helicopters can be effective for line production.
- Use type III 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. Many helicopters are equipped with units for injecting foam into the bucket or tank.

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- multiple drop capable

Fixed Tanks – A variety of tank systems have been developed by different operators and agencies. 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. (Ex., S-64 Sky Crane with a 2500 gallon tank, foam injection, 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.

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

http://www.fs.fed.us/fire/aviation/av_library/ismog/ismog-fs.pdf

Smokejumper aircraft are dispatched with a standard load of eight jumpers and equipment to be self-sufficient for 48 hours. A typical mission takes 30 minutes over a fire. A spotter (senior smokejumper in charge of smokejumper missions) serves as the mission coordinator which may include coordinating the airspace over a fire until aerial supervision (ATGS/ASM/Lead) arrives.

Ram-air smokejumpers can be deployed in winds up to 30 mph. The smokejumper spotter will determine if conditions are appropriate.

Approach to the Fire

Smokejumper aircraft normally approach the fire at 1500 feet AGL (streamer drop altitude for both the BLM and Forest Service).

Drop Mission

The drop mission is a four- part operation and takes 15-40 minutes depending on the number of jumpers being deployed. Erratic winds, changing fire behavior, and other factors can extend this time.

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 in order to conduct simultaneous tactical operations.

Streamer Runs

The smokejumper aircraft will usually initiate a left hand pattern over the selected jump spot at a minimum of 1500 feet AGL (measured from the jumper release point). One to three streamer passes are conducted to verify the wind direction and speed.

Jump Runs

Smokejumpers are deployed in one to four person sticks depending on the size of the spot, wind, and the aircraft. Depending on the parachute system being used, jump runs will be conducted at either 1500 feet AGL (USFS round parachutes) or 3000 feet AGL (BLM square parachutes). Mixed loads can vary but the standard practice is to deploy the USFS jumpers using the 1500' AGL pattern and then climbs to the 3000' AGL pattern for the BLM jumpers.

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 over the drop point. The number of passes depends on the number of jumpers deployed, size of spot, and equipment needed. Runs vary from one pass to ten or more. The spotter will notify the ATGS or Leadplane of the number of passes anticipated and when the mission is completed.

Considerations

Priorities vary on 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

Type 2 and 3 helicopters are used for rappelling by the USFS and NPS. Type 3s, normally carry two rappellers and a spotter; Type 2's, up to six rappellers and a spotter. The mission performed is the same as smokejumpers, initial attack and tactical support missions on large fires.

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 not configured to rappel unless they know that a rappel is necessary from intelligence provided by personnel at the site (ATGS, ASM, Leadplane, or recon aircraft). 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 reasonably 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. It takes each set of rappellers 15 to 25 seconds to descend on the rope. Once all the rappellers are on the ground, and their ropes released from the helicopter, the spotter deploys the cargo (cargo is sometimes deployed prior to the rappellers). The total time varies, but normally requires between 5 to 15 minutes to perform the operation (depending on the number of 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 monitor the Guard frequency at all times 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 to not 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 in order 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 (CL 215/415)

Airport Requirements

Runway – A 3500 foot hard surface runway with a taxiway and ramp capable of supporting 36,000 lbs. is required.

Fuel – The CL-215 requires 100 octane low lead (100 LL) while the CL- 415 requires Jet A fuel.

Foam – A supply of foam (3-55 gallon drum capacity per fuel cycle) and the necessary

equipment for handling it and pumping or loading the concentrate on the aircraft should be anticipated.

USFS - Forest Service contracted water scoopers shall not be loaded with chemical retardant or foam.

Scooping Site Requirements

The water source (or pickup lake) should be a minimum of one mile long, ¼ mile wide, free of obstructions, and at least six feet deep. The scooping path does not have to be straight, as the aircraft are 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. Both aircraft scoop at 80 kts, are on the water for about 15 seconds, and cover a distance of about 2,000 feet.

Foam Use

Concentration – Foam can be injected into the load at a concentration of 0.3% up to 3% in some aircraft models. Useful concentrations typically range from 0.3% to 1.0%. Foam concentrations greater than 0.6% are prone to drift.

Wet Foam – A typical method in using foam is to attack a hot fire with straight water or wet foam (0.3%).

Dripping Foam – After a fire has been knocked down, follow up with dripping foam (0.5%).

Dry Foam – Dry (0.6-1.0%) foam may be used instead of dripping foam after initial knockdown with wet foam.

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+ minutes.

Environmental Limitations

- Foam is not recommended within 300' 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 prior to departing a fire.

Tactical Considerations

Tank Configuration – The CL-215 has two compartments totaling 1400 gallons, and the CL-415 has four compartments totaling 1600 gallons. Loads can be dropped salvo, in trail, or split into separate drops. A salvo load for both airtankers is about 280' long and 65' wide. A trail drop is about 400' x 40'.

Drop Height – Drop height ranges from 100'-150', depending on factors such as foam vs.

straight water and direction of run (into wind vs. downwind).

Clearance – When dropping near ground crews, personnel must be moved at least 200' to the side. When drops are made 1000 feet or more in advance of crews, no clearance is necessary except to confirm no one is on the line.

Flight Patterns and Turnaround Times

Typical Flight Pattern – The typical flight pattern (or circuit) is oval, with a pickup into the wind and a downwind drop on the fire. This is the most common and efficient circuit and preferred by most pilots.

Turnaround Times – When water sources are located next to the fire, a 90-second turnaround time is possible.

- **CL-215** – A rule of thumb for turnaround times for the CL-215 in an oval circuit is; turnaround time equals miles from lake to fire plus two minutes scooping (ex. 5 miles to the fire from the lake is a 7 minute turn).
- **CL-415** – Typical turnaround times for the CL-415 are: 1 mile - 3 minutes, 3 miles - 4 minutes, 6 miles - 6 minutes, 10 miles - 9 minutes, and 15 miles - 12 minutes.

Alternative Flight Patterns – If fire intensity or other reasons indicate a need for drops into the wind or crosswind, then a U-shaped circuit or a Figure 8 will be necessary. Turnaround time will be slightly longer.

Fuel Cycle Duration

Average fuel cycle is about 4 hours. A quick turn from a close lake can shorten the cycle to 3.5 hours due to increased fuel demand.

Direct Attack and Initial Attack

Scoopers are best suited for initial attack fires. They are most commonly used for direct attack on the fire's edge with drops made half in/half out. Like other air resources, they are most effective when worked closely with ground resources, although drops should not be delayed while waiting for ground resources. High intensity fires may require drops to be made into the wind.

Parallel Attack

In the event ground resources are delayed or drops advance faster than the crews, a parallel attack is effective. Drops should be placed parallel to the fire's edge at a distance governed by rate of spread and progression rate of ground resources. The ATGS should consider an increase in foam proportion to dripping (.5%) or dry foam (.6-.8%). If the fire does not reach the drops in 30 to 45 minutes, reinforcement drops should be made. If progress by ground crews is too slow, retardant may be a better option, with foam and water used for knockdown and cooling the line.

Indirect Attack

While many scooping aircraft can be loaded with retardant at a tanker base, they are not designed to efficiently and effectively drop retardant. Therefore, their capabilities at indirect attack are limited. Narrow, wind-driven fires can be successfully attacked indirectly using foam drops, taking advantage of light fuels or fuel breaks. CL-215's and CL-415's are effective in supporting indirect tactics when used to reinforce retardant or other control lines, hot spotting, and knockdown of slopovers and spot fires.

Supervision

Scoopers are fixed-wing resources and are supervised by ATGS, ASM, Lead, or ATCO.

Scooper Aircraft Communications

Generally, communications with scooping tankers are not much different than conventional airtankers with respect to target description, clearing the line, and drop evaluations, etc.

Scooping Operation

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

Foam Instructions

Instructions can be given after the scooping operation on whether or not to inject foam and at what percent so the load has time to mix.

Long Turnarounds

On long turnarounds, request the tanker to give a one-mile final call and give your target description at that time.

Standard Communications

Confirm the line is clear, make the drop, and after the drop, evaluate the load. Instructions for the next load, including foam concentrations, can be given at this time if possible. Otherwise, wait until the tanker is "up" for the next target description.

Scooper Aircraft Separation

Once in the circuit on the fire, CL-215's and CL-415's work 500 feet AGL and lower.

Separation of Scoopers in the Circuit – If two tankers are working the same circuit, which is very common, the aerial supervisor can choose to daisy-chain the two tankers or they can be worked in tandem.

- **Daisy Chaining** – One scooper is on the lake while the other drops. Generally works best for quick turnaround times.
- **Tandem** – One scooper leads the other. Generally works best, is more efficient, and requires less supervision for long turnaround times. Also allows ground resources more time between drops to work the line.
- **Four Scoopers** – If four scoopers are in a circuit, they can be sequenced singly in a daisy-chain, or they can be worked in two tandem pairs.

Mixing CL-215's & CL-415's – Both can work in the same circuit, however the CL-415's are faster and will overtake the 215's on the circuit. If possible, keep separate.

Integrating with other Aircraft – Scoopers can be successfully integrated with suppression and logistical missions of other aircraft.

Horizontal Separation – The most common separation method is to assign different aircraft types to separate parts of the fire, ex., scoopers on the right flank, helicopters on the left or conventional tankers on the left.

Sequencing – Sequencing of aircraft can be very efficient and often is necessary but requires close supervision.

- Have the scooper extend the circuit if there is a need for another aircraft to work the same area as the scooper for a short time, such as a sling load, personnel drop, or a quick recon.
- If another aircraft needs to work the same area as the scooper for a sustained period, either orbit the tanker or reassign.
- Sustained bucket operations in the same target area as scoopers is not advised except for very long scooper turnaround times.
- CL-215/415 scoopers can support conventional airtankers by sequencing them in between retardant drops to cool the fire in advance of the retardant or to assist in holding the fire as it approaches the retardant.

Canadian Scooper Terminology

Following is a short list of terms relating to the use of the scooping aircraft used by Canadian Air Attack officers. Some of the terms are common to the U.S. and a few are slightly different.

Fire Traffic Pattern

Circuit – Flight route taken by scooping aircraft from the water source to the fire and return.

- **Typical Circuit –** Oval or rectangular flight route that is defined by an 'into the wind' pickup on the lake and a downwind drop on the fire.
- **U-Shaped Circuit –** A flight route resembling a "U" that is defined by an 'into the wind' pickup on the lake and an 'into the wind' drop on the fire.
- **Figure-8 Circuit –** An intersecting flight route in the shape of an "8" that is defined by an 'into the wind' pickup on the lake and can accommodate either a crosswind drop on the head or an 'into the wind' drop elsewhere on the fire.
- **Base Leg** – The leg of the bombing circuit immediately preceding and perpendicular to the final leg (base leg for pickup or base leg for the drop).
- **Final Leg** – The last leg of the bombing circuit direct to the target or the lake.
- **Bomb Run** – Flight path of the tanker to the target.

Target Descriptions

Tie-in – Connect the drop to a specific reference point or anchor point.

Tag on – Connect the tail end of the drop to a given point, usually the head end of the last drop.

Extend – Tag on and lengthen the line in a specific direction.

Lap on – Cover a previous drop entirely or to one side or the other. Reinforce.

Lap on left/right – Cover a previous load to the left or right to widen the drop pattern (usually about 1/3 overlap).

Roll-Up – Connect the head end of the drop to a given point or the tail end of a previous drop.

Half On/Half Off – Half the load on the fire, half on unburned fuel. Half & half or half in/half out.

Span – Distance equal to one wing span of the tanker being used.

String Drop – Trail drop

Train Drop – Trail drop

Bull's Eye – Load was placed exactly where requested.

Head End of Drop – Where the last of the load hits the ground.

Tail End of Drop – Where the load first hits the ground.

Other Terminology

Bird Dog – ATGS platform except Bird Dog combines low level lead-ins when deemed necessary with an orbit and direct method. Similar to the ASM.

Orbit and Direct – Method of supervision where Bird Dog is above the fire in a right hand pattern and gives verbal targets and direction to airtankers as opposed to providing low level lead-ins.

Lead In – Same as a Lead.

Inspection Run – Same as a low pass or dry run.

Dummy Run – Same as a 'show-me'.

Hold – Canadians may use this term for "go around - do not drop" as well as orbit outside the incident airspace.

Stay – May also be used to instruct a tanker to proceed to a designated location and await instruction. Hold & orbit.

Reload – Load and return.

Period of Alert – Duty day or duty time.

Chapter 10 – All Hazard Incidents

Introduction – Fire incidents have long utilized aerial supervision for coordinating aerial resources. The same principles of supervising and directing aircraft can also 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.

Air Operations Supervision

Fixed-Wing and Helicopter Coordinators

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 Fixed-Wing Coordinator (ATCO), Helicopter Coordinator (HLCO), or both. Both positions report to the ATGS/ASM. The HLCO's role and responsibilities are basically the same as for a fire incident.

- The Fixed-Wing Coordinator has primary responsibility for coordinating all assigned fixed-wing operations at the incident. The Fixed-Wing Coordinator is always airborne. More than one Fixed-Wing Coordinator may be assigned to a large incident.
- 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 Fixed-Wing Coordinator (ATCO) to coordinate and integrate the mix of aviation assets.

Criteria for Assigning Aerial Supervision

Air operations meeting the criteria list below require a moderate to high level of supervision and coordination. 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 utilizing air support.
- Mix of both civil and military aircraft operating in the same airspace or operations area.
- When conditions require airspace management, air traffic control 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

The interaction between aerial supervisors (Lead, ATGS, ASM, and HLCO) is well understood and practiced on fire incidents. Interactions and communications protocol is far less established and will vary greatly on other types of incidents. Although all risk 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 persons other than the traditional Operations Section Chief, 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 the Technical Specialist (chain of command, communications protocol, authority, etc.).

Use of Military Aircraft

It is important to fully understand military organization, their standard operating procedures, 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 Air Operations Branch Director and aerial supervisor in assigning and coordinating military air operations.

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

Air Operations Associated with all Hazard Incidents

During the past few decades, aircraft have become an important tool in combating both natural and human caused incidents. Possible uses of aircraft for various types of incidents are listed in the table below.

Table 9. Possible Uses of Aircraft by Type of Incident

Air Operations	Fire	Volcanic Eruption	Earth-quake	Search/ Rescue	Flood	Hurricane	Oil Spill	Spray Project	Law Enforc.
Aerial Retardant, Spray	X	X	X				X	X	
ATCO / Leadplane	X	X	X	X	X	X	X	X	
Helicopter Rappel – Personnel	X	X	X	X	X	X			X
Helicopter Land – Personnel	X	X	X	X	X	X	X	X	X
Parachute Delivery – Personnel	X	X	X	X	X	X	X		
Parachute Delivery – Cargo	X	X	X	X	X	X	X		
Helicopter Sling Load – Cargo	X	X	X	X	X	X	X		X
Helicopter Internal – Cargo	X	X	X	X	X	X	X	X	X
Recon/Assessment – Fixed-Wing	X	X	X	X	X	X	X	X	X
Recon/Assessment – Helicopter	X	X	X	X	X	X	X	X	X
Search – Fixed-Wing	X	X	X	X	X	X			X
Search – Helicopter	X	X	X	X	X	X			X
Medevac – Helicopter	X	X	X	X	X	X	X	X	X
Medevac – Short Haul Helicopter.	X	X	X	X	X	X	X	X	X
IR Detect/Map - Fixed-Wing	X	X	X		X		X		X
IR Detect/Map – Helicopter	X	X	X		X		X		X
Helitorch	X						X		
ATGS or Air Traffic Control	X	X	X	X	X	X	X	X	X
News Media	X	X	X	X	X	X	X	X	X
VIP Flights	X	X	X	X	X	X	X	X	X

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Chapter 11 – 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 Incident Response Pocket Guide (IRPG), the Interagency Standards for Fire and Fire Aviation Operations (Red Book), CALFIRE 8300, and the Interagency Helicopter Operations Guide (IHOG).

Factors to consider during the risk assessment process

- Any flight mission has a degree of risk that varies from 0% (no flight activity is conducted) to 100% (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, Air Operations Branch Director, Duty Officers, agency Fire Management Staff, Incident Commanders, Dispatchers, and Line Officers/Managers**.**
- Ultimately the pilot in command has the authority to decline a flight mission that he or she considers 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:

Monitor the overall aviation operation for human factors related issues

- Task saturation
- Fatigue, burnout, and stress
- Acceptance of risk as normal
- Lack of situational awareness

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.

Utilize the appropriate aircraft for the mission

- Turbine vs. piston
- Heavy tankers vs. SEATs
- Density altitude issues
- Helicopter types

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 Air Traffic Control

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 per visibility, routing procedures and communications capability.

Obtain Input

Discuss operations safety with Leadplane, Helicopter Coordinator and pilots. Mission debriefings are an excellent source of information; **Air crewmembers will utilize After Action Reviews (AAR) to critique mission effectiveness with other incident and airbase when possible.**

System Safety Assessment

The effectiveness of risk assessment and management can be increased through utilization 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 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 10. System Safety Assessment for Aerial Supervision

System – Aircraft

Sub-systems	Hazards	Pre-Mitigation Likelihood	Pre-Mitigation Severity	Pre-Mitigation Outcome	Mitigation	Post mitigation Likelihood	Post mitigation Severity	Post mitigation Outcome
Avionics	Avionics failure.	Occasional	Marginal	Medium	Minimum equipment list (MEL) establishes minimum requirement. Mission requirements as determined by the flight crew. Integrate into preflight checklist.	Improbable	Negligible	Low
	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. (Can't run radios or GPS, etc.).	Occasional	Marginal	Medium	Release, replace the pilot, 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
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 sub-standard 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 three 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

System - Flight Operations

Sub-systems	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 ops. 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 (CFIT) due to low level operations.	Frequent	Catastrophic	High	Ensure high level recon is completed prior to commencing low level flight. Manage radio communication. Proper aircraft configuration. Reduce exposure time in low level. Consult sectional chart/hazard map, Consult 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	Communication established with all aircraft. Situational awareness. TCAS Establish clear and concise directions for simultaneous operations, (virtual fence, geographic separation, altitude separation, holding/timing, Establish Initial point, ingress/egress route.	Remote	Catastrophic	Serious

System - Flight Operations, Cont.

Sub-systems	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 rebrief the mission. Coach, proficiency checkride, retrain / recertify.	Remote	Critical	Medium
	Unnecessary exposure due to inefficient operational use of tactical aircraft.	Probable	Critical	High	SOPs for all tactical aircraft types. Right tool for job. Training, feedback, brief/debrief.	Remote	Critical	Medium
Airspace	FTA: Aircraft not complying with procedures.	Probable	Catastrophic	High	Aerial supervision enforces FTA procedures.	Improbable	Critical	Medium
	Multiple initial attack 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. 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

System - Flight Operations, Cont.

Sub-systems	Hazards	Pre-Mitigation Likelihood	Pre-Mitigation Severity	Pre-Mitigation Outcome	Mitigation	Post mitigation Likelihood	Post mitigation Severity	Post mitigation Outcome
Airspace	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
Communications	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

System – Personnel

Sub-systems	Hazards	Pre-Mitigation Likelihood	Pre-Mitigation Severity	Pre-Mitigation Outcome	Mitigation	Post mitigation Likelihood	Post mitigation Severity	Post mitigation Outcome
Human Factors	Loss of situational awareness due to aircrew fatigue/burnout.	Probable	Critical	High	Adhere to flight and duty limitations policy. Activate phase limitations.	Occasional	Critical	Serious
	Hazardous air operations developing through ineffective CRM.	Remote	Critical	Medium	Re-evaluate task allocation. Brief and debrief.	Improbable	Critical	Medium
	Acceptance of high risk as normal. (Complacency).	Probable	Catastrophic	High	Re-evaluate risk vs. benefit. Solicit feedback from other flight crews. Utilize CRM to validate mission parameters. Validate mission, or remove the high risk taking individual from the mission.	Remote	Catastrophic	Serious
	Hazardous air operations developing due to external pressures.	Occasional	Critical	Serious	Do not allow external pressure to influence the operation. Utilize CRM to ensure an effective operation with acceptable level of risk.	Remote	Critical	Medium
	Hazardous attitude: Anti authority, macho, invulnerability, impulsiveness, and resignation.	Frequent	Critical	High	Remove the individual from the mission. Properly supervise employees. Adhere to work-rest guidelines, flight and duty limitations policy, etc. Validate and stick to incident strategy and tactics.	Occasional	Critical	Serious

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
- ATGS Fire Orders & Watch out Situation (see below)
- Aircraft incident/accident
- Aircraft/Aircrew performance

Chapter 12 – Job Aids and Resources

Required Job Aids (Lead/ASM)

A full U.S. (Contiguous United States) approach and IFR chart coverage or approved Electronic Flight Bag (EFB) 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/clip board.
- **Headset**
- **Frequency Guide**
- **Batteries** – Headset, Camera, flashlight, etc.
- **Flashlight**
- **Camera**
- **Overnight Bag**
- **Maps**
  - Current FAA sectional chart coverage area
  - Agency Maps
  - Retardant Base Coverage Map
  - Local Hazard Map (from Airtanker Base Manager or Dispatch)
  - Incident Map (updated daily)
  - Retardant base map
- **Air Tactical Forms** – Download from www.nwcg.gov.
  - Fire Size up
  - ATGS/Lead/ASM checkride
  - Initial Attack/Extended Attack ATGS Form
  - SEAT Pilot Mission Documentation Log
  - Aerial Supervision Transition Checklist
  - Leadplane, ASM, or ATGS Mission Log
  - Airtanker Briefing Checklist
  - Aerial Supervision Cost Summary
  - Pilot Flight time and Duty Day Tracking

Publications

- Interagency Smokejumper Pilot Operations Guide
- Interagency Smokejumper Operations Guide
- Interagency Standards for Fire and Fire Aviation Operations (Red Book), NFES 2724
- Tables of Sunrise and Sunset
- Radio Frequency Guide
- USFS-5700-1 Visual Signal Code Card
- Radio Programming Directions
- Recommended Retardant Coverage Levels
- Airtanker Line Length Production Charts
- Agency Specific Information and Policies
- Incident Action Plan (IAP): Available daily through ATGS, Air Operations Branch Director or Dispatch
- Aviation Safety Communiqué (SAFECOM): USFS-5700-14 and OAS-34
- Interagency Air Space Coordination Guide
- National Interagency Mobilization Guide, NFES 2092
- Geographic (agency) Mobilization Guide
- Forest (unit) Mobilization Guide
- Agency Aviation Management Manual Handbooks
- DOI - USDA Aircraft Radio Communications and Frequency Guide
- National Airtanker Contract
- Airtanker Base Operations Guide and Directory
- Agency Aviation Plan
- Area Planning AP/1B Chart (military training routes)
- Military Use Handbook
- Interagency Single-Engine Airtanker Operations Guide (ISOG), PMS 506.
- Interagency Helicopter Operations Guide (IHOG), PMS 510.
- Interagency Aviation Mishap Response Guide and Checklist, PMS 503.

Glossary

This document contains terms and definitions commonly used in aviation and in the 2016 Interagency Helicopter Operations Guide.

Terms and definitions that match the 2015 published NWCG Glossary of Wildland Fire Terminology are annotated with an asterisk (*).

Term	Description
Abeam	An aircraft is abeam a fix, point, or object when the fix/point/object is approximately 90 degrees left or right of the aircrafts track.
Abort	To terminate a planned aircraft maneuver.
Action Plan	Any tactical plan developed by any element of ICS in support of the incident action plan.
AGL	Above ground level.
AIR Attack	ICS identifier for the Air Tactical Group Supervisor.
Airtanker Coordinator (ATCO)	Airborne position supervised by the Air Tactical Group Supervisor. Assigns airtankers to specific targets. Supervises and evaluates drops. The position is normally filled with a Leadplane.
"A" (Alpha)	Designation for State of Alaska DNR ASM Aircraft.
Anchor Point	A strategic and safe point or area, usually a barrier to fire spread, from which to start construction of the control line.
ASM	Federal designation for an Aerial Supervision Module platform with an Air Tactical Pilot and Air Tactical Supervisor on board. This module can perform aerial supervision and low-level operations including the lead profile.
Assigned to	Tactical resource allocated to an incident. The resource may be flying enroute to and from, or on hold at a ground site.
ATP	Federally designated Air Tactical Pilot. Pilot of an ASM who is primarily responsible for aircraft safety and providing aircraft coordination over the incident. The ATP meets the Interagency training requirements for Leadplane operations and has completed ASM?CRM training.

Term	Description
ATS	The ATS is a qualified ATGS who has received specialized training and authorization to function as an ASM crewmember. The ATS is an ATGS who also utilizes CRM to evaluate and share the incident workload with the ATP.
Barrier	Any obstruction to the spread of the fire. Typically an area or strip devoid of flammable fuel.
Blowup	Sudden increase in fire intensity or rate of spread sufficient to preclude direct control.
Base (of a fire)	The part of the fire perimeter opposite the head (see origin). Also referred to as rear or heel.
"B" BRAVO	Federal designation for Aerial Supervision Modules.
Break (left or right)	Means turn left or right. Applies to aircraft in-flight, usually on the drop run and when given as a command to the pilot. Implies immediate compliance.
Burn out	Fire set at the inside edge of a control line to consume unburned materials between the fire and the control line. Usually associated with indirect attack.
Canopy	The stratum containing the crowns of the tallest vegetation present (living or dead), usually above 20 feet.
Cardinal Points	The four chief points of the compass: North, South, East, and West.
Check Point	A rotor wing reporting location clearly identified by the aerial supervisor. See to chapter 7, page 82 for more detail.
Civil Twilight	Civil Twilight is defined to begin in the morning, and to end in the evening when the center of the Sun is geometrically 6 degrees below the horizon. This is the limit at which twilight illumination is sufficient, under good weather conditions, for terrestrial objects to be clearly distinguished.
Clock Method	A means of establishing a target or point by reference to clock directions where the nose of the aircraft is 12 o' clock, moving clockwise to the right wing at 3 o'clock, the tail at 6 o'clock, and the left wing at 9 o'clock.

Term	Description
Configuration	How the aircraft is equipped, outfitted, modified for a mission or segment of a mission. Also refers to use of drag devices (flaps, gear) to modify flight characteristics.
Congested Area	FAA (non-specific) term for areas that require additional precautions and procedures to conduct low level flight operations. It is applied by the FAA on a case by case basis. The regulation addresses, "any congested area of a city, town, or settlement, or over any open air assembly of persons...."
Constant Flow Tank	A single compartment with two doors controlled by a computer. Capable of single or multiple even flow drops at designated coverage levels from .5 GPC to 8 GPC.
Control Line	An inclusive term for all constructed or natural fire barriers and treated fire edge used to control a fire's spread.
Cover Assignment	Airtankers ordered to a different base to provide initial attack coverage at the new base. Sometimes referred to as "Move Up and Cover."
Coverage Level	A numerical value representing the number of gallons of retardant mixture dropped, or prescribed, to cover fuels in a 100 sq. ft. area (GPC).
Cut Off Time	Time when operations involving low level flight maneuvers must be suspended.
Delayed Attack Fire	A fire that, due to its lower priority and/or unavailability of ground resources, will not be staffed for several hours or possibly several days.
Direct Attack	Control effort (retardant line, fireline) conducted at fire perimeter (fire edge) - usually under low fire intensity conditions.
Divert	Change in aircraft assignment from one target to another or to a new incident.
Drift Correction	Offset flight path flown to compensate for wind induced retardant drift.
Drift Smoke	Smoke that has drifted from its point of origin and has lost any original billow form.

Term	Description
Drop	Aerial release of paracargo, retardant, or water/foam.
Drop Configuration	The type of drop the pilot selects to achieve the desired coverage level based on the aircrafts door/tank system.
Drop Zone	The area around the target to be dropped on.
Dry Run	A low pass over the target without dropping to evaluate drop conditions and/or alert ground personnel of an impending live run.
Early	Indicating drop was early or short of the target.
Engine	(In fire context) A ground vehicle crewed by firefighters that dispenses water or foam normally with fire hoses and nozzles.
Escape Route	The safest, quickest or most direct route between a firefighter's location and a safety zone.
Exit	Term used to indicate the flight route away from the drop area.
Extend/Tag on	Drop retardant so that the load overlaps and lengthens a previous drop.
False Alarm	A reported smoke or fire requiring no suppression action.
Finger	A narrow elongated portion of a fire projecting from the main body.
Federal	Term used to define Department of the Interior and its bureaus and the USDA Forest Service in reference to land ownership, protection responsibilities, contracts, aircraft and other context.
Fire Break	A natural or constructed barrier used to stop or check fires or to provide a control line from which to work.
Fireline	A control line that is void of burnable material. Fire lines are normally constructed by hand crews.
Fire Perimeter	The active burning edge of a fire or its exterior burned limits.

Term	Description
Fire Shelter	An aluminized, heat reflective, firefighter's personal protective pup tent used in fire entrapment situations. The heat reflection capability of the exterior is the primary function of the shelter. DO NOT drop fire retardants on the tent, as it will compromise the heat reflection capability of the shelter.
Fixed Tank	A tank mounted inside or directly underneath an aircraft, which contains water or retardant for dropping on a fire.
Fixed-Wing Coordination	A non-fire airborne position designed to supervise airplanes on incidents.
Flanking Attack	An attack made along the flanks of a fire either simultaneously or successively from a less active or anchor point and endeavoring to connect the two lines to the head.
Flanks	The parts of a fire perimeter that are roughly parallel to the main direction of spread. The left flank is the left side as viewed from the base of the fire, looking toward the head.
FLIR	Forward Looking Infrared.
FLIR/ATGS	ATGS aircraft equipped with FLIR. FLIR used in ATGS operations.
FM	Refer to VHF-FM.
Fuel Break	A wide strip or block of land on which the vegetation has been permanently modified to a low volume fuel type so that fires burning into it can be more readily controlled.
Fugitive Retardant	A clear retardant, without iron oxide (red color agent), or a retardant with a red color agent that fades or becomes invisible after several days exposure to ultraviolet sunrays.
Gap	A weak or missed area in a retardant line.
Go Around	Abort the retardant run.
Gel	Water, which is chemically enhanced and utilizes in direct attack operations as a suppressant.

Term	Description
GPC	A term relating to retardant coverage levels meaning Gallons per 100 Sq. Ft.
Head	The most rapidly spreading portion of a fire perimeter, normally located on the leeward or up slope side.
HEL CO (HLCO)	Call sign identifier of the Helicopter Coordinator.
Here	Term communicated by the Leadplane pilot to the airtanker or helitanker pilot identifying the target location and starting point of a drop.
Helitanker	Heavy (Type 1) Helicopters configured with fixed tanks or a bucket for dropping water, foam, or retardant.
Hold (Holding Area)	Refer to chapter 7.
Holding Action	Use of an aerial application to reduce fire intensity and fire spread until ground resources arrive. Common with delayed attack fires.
Hoselay	Arrangement of connected lengths of fire hose and accessories beginning at the first pumping unit and ending at the point of water delivery.
Hotshot Crew	A highly trained firefighting crew used primarily in handline construction.
Hotspot	A particularly active part of a fire.
Indirect Attack	Control line located along natural or human made firebreaks, favorable breaks in topography or at a considerable distance from the fire perimeter.
Initial Point (IP)	Refer to chapter 7.
Intervalometer	A cockpit mounted electronic device/selector box which actuates the compartment door singly or multiple doors simultaneously or in sequence, at preset time intervals. Pilot or co-pilot selects number of doors and time interval between doors to produce the desired coverage level and line length.
Island	Green or unburned area within the fire perimeter.

Term	Description
Jettison	To dispose of (drop) unused retardant prior to landing.
Knock Down	To reduce flame or heat in a specified target. Indicates the retardant load should fall directly on the burning perimeter or object. Used to assist ground forces.
Late	Indicating the drop was late or overshot the target.
Leadplane	An airplane crewed by a qualified Leadplane pilot tasked to lead airtankers in low level drop runs.
Leadplane Pilot	Performs Airtanker Coordinator duties and is authorized to conduct flights below 500 feet AGL to access flight conditions, hazards, and to identify the target.
Leadplane Final Evaluator Pilot	A Leadplane pilot designated by the USDA-USFS or BLM to evaluate Leadplane pilot trainees for initial certification and Leadplane pilots for recertification.
Leadplane Evaluator Pilot	Leadplane pilot designated by the USDA-USFS or BLM to train Leadplane pilot trainees.
Live Run	A flight over the drop area in which a discharge of cargo or retardant/water will be made.
Load and Hold	The airtanker is being ordered to reload and hold at the retardant base awaiting further instructions.
Load and Return	The airtanker is being ordered to reload and return to the fire with the load of retardant.
Low Pass	Low-altitude run over the target area used by the Leadplane pilot and/or airtanker pilots to identify the target and assess flight conditions on the approach and exit.
MAFFS	Modular Airborne Firefighting Systems - Military aircraft equipped to drop retardant. Used in emergencies to supplement commercial airtankers.
Main Ridge	Prominent ridge line separating river or creek drainage. Usually has numerous smaller ridges (spur ridges) extending outward from both sides. Can be confusing if not covered in orientation.

Term	Description
*May day	International distress signal/call. When repeated three times it indicates imminent and grave danger and that immediate assistance is required.
Leadplane Pilot Coach	A pilot with a minimum of 2 years' experience as a qualified Leadplane pilot assigned to assist a trainee Leadplane pilot to successfully complete training.
Mission (Leadplane)	A Leadplane mission consists of a flight on an actual fire where retardant is dropped. Each additional fire flown during a single flight counts as an additional mission.
Mission (ATGS)	An ATGS mission consists of a flight on an actual incident where coordination of airborne resources takes place. Each additional incident flown during a single flight counts as an additional mission.
Mission (ASM)	Any aerial supervision mission (ATGS/Leadplane) flown in the ASM configuration.
MOA	A Military Operations Area (Special Use Area) found on aeronautical sectional charts.
MSL	Mean Sea Level.
MTR	A Military Training Route found on aeronautical sectional chart and AP/1B maps. Routes accommodate low altitude training operations - below 10,000ft. MSL - in excess of 250 KIAS.
On Target	Acknowledgment to pilot that the drop was well placed.
Orbit	See Hold.
Origin	Point on the ground where the fire first started.
Overrun (Overtake)	Unintentional passing of the aircraft in the lead by the trailing aircraft.
Parallel Attack	A control effort generally parallel to the fire perimeter, usually several feet to +100 ft. away. Allows line construction before the fires lateral spread outflanks line construction operations.

Term	Description
Perimeter	The outside edge of the fire.
Pockets	Areas of unburned fuel along the fire perimeter.
Portion of Load	Portion of the airtanker retardant to be dropped. Portions are identified by fractions of the load (1/4, 1/3, ½), whole load, or defined start/stop points on the ground.
Pre-Treat	Laying retardant line in advance of the fire where ground cover or terrain is best for fire control action, or to reinforce a control line, often used in indirect attack.
Reburn	Subsequent burning of an area in which fire has previously burned but has left flammable fuel that ignites when burning conditions are more favorable.
Retardant (Long-Term)	Contains a chemical that alters the combustion process and causes cooling, smothering, or insulating of fuels. Remains effective until diluted or rinsed off.
Retardant (Short-Term)	Chemical mixture whose effectiveness relies mostly on its ability to retain moisture, thereby cooling the fire. Common short-term retardants are water and foam.
Rotor Span	The length of a rotor diameter. Used to make adjustments in alignment of flight route when dropping water/retardant.
Route (Flight)	The path an aircraft takes from the point of departure to the destination.
Running	Behavior of a fire, or portion of a fire, spreading rapidly with a well-defined head.
*Saddle	Depression or pass in a ridgeline.
Safety Zone	An area used for escape in the event the fireline is overrun or outflanked, or in case a spot fire causes fuels outside the control line to render the fireline unsafe. During an emergency, airtankers may be asked to re-enforce a safety zone using retardant drops.
Scratch Line	A preliminary control line hastily built with hand tools as an emergency measure to check the spread of a fire.

Term	Description
Secondary Line	A fireline built some distance away from the primary control line, used as a backup against slopovers and spot fires.
Shoulder	The part of the fire where the flank joins the head. Referred to as left or right shoulder.
Slash	Debris left after logging, pruning, thinning or brush cutting.
Slopover	The extension of a fire across a control line.
Smoldering	Behavior of a fire burning without flame and slowly spreading.
Snag	A standing, dead (defoliated) tree. Often called stub, if less than 20 feet tall.
Special Use Mission (DOI)	Flight operations requiring special pilot skills/experience and aircraft equipment to perform the mission.
Spot Fire	A fire caused by the transfer of burning material through the air into flammable material beyond the perimeter of the main fire.
Spotting	Behavior of a fire producing sparks or embers that are carried by the wind and start new fires outside the perimeter of the main fire.
Spur ridge	A small ridge, which extends finger-like from a main ridge.
Strategy	The general plan or direction selected to accomplish incident objectives (i.e.: direct, indirect, or parallel attack).
SUA	Special Use Airspace including Military Operations Areas (MOA's), Restricted Areas, Prohibited Areas, Alert Areas, Warning Areas, and Controlled Firing Areas.
Suppressant	A water or chemical solution that is applied directly to burning fuels. Intended to extinguish rather than retard.
Surface Fire	Fire that burns surface litter, other loose debris of the forest floor, and small vegetation.
Tactic	Deploying and directing resources to accomplish the objectives designated by the strategy (i.e.: hoselay, handline, retardant line, or wet line).

Term	Description
Target	The area or object you want a retardant /water drop to cover.
TCAS	Traffic Collision Avoidance System, electronic aid that gives the azimuth, distance, and relative altitude of transponder- equipped aircraft in relation to the TCAS equipped aircraft.
TFR (91.137)	Temporary Flight Restriction. Airspace within which certain flight restrictions apply.
Tie-In	To connect a retardant drop with a specified point (road, stream, previous drop, etc.).
Traffic Pattern	The recommended flight path for aircraft arriving at and departing from an airport.
Traffic Pattern-Base	A flight path at right angles to the landing runway or target off its approach end.
Traffic Pattern-Crosswind	A flight path at the right angles to the landing runway or target off its upwind end.
Traffic Pattern - Downwind	A flight path parallel to the landing runway or target in a direction opposite to landing or drop direction.
Traffic Pattern - Final	A flight path in the direction of, and prior to, the landing or drop area.
Traffic Pattern - Upwind	A flight path parallel to the direction of the final before turning crosswind.
UHF	Ultra High Frequency. Common to military aircraft. Incompatible with VHF radio system. Operates in 300-3000 MHz range.
VHF	Very high frequency radio. The standard aircraft radio that all civil and most military aircraft use to communicate with FAA facilities and other aircraft.
VHF-AM	Amplitude modulation - Aircraft radio - ranges 118 MHz to 136.975 MHz. Used on wildland fire incidents for ground-to- air and air-to-air communications.

Term	Description
VHF-FM	Frequency modulation radio, multi-agency radio commonly used for dispatch, land-based mobile and airborne communications. Operates in range of 138 MHz to 174 MHz.
Variable Flow Tank System	Multiple tanks or compartments controlled by an electronic intervalometer control mechanism to open doors singly, simultaneously or multiple doors in an interval sequence.
Victor	Another way of referring to VHF-AM.
Virtual Fence	Landmark or feature utilized to maintain horizontal aircraft separation.
Waterway	Any body of water including lakes, rivers, streams, and ponds whether or not they contain aquatic life.
Wingspan	The length of the airtankers wing span from tip to tip. Used to make low level ground track adjustments. Note: Adjustments less than half a wingspan are given in feet.

Abbreviations

Abbreviation	Description
AFMC	Air Force Mission Commander
ASM	Aerial Supervision Module
AFS	Alaska Fire Service
AMIS	Aviation Management Information System
ATCO	Airtanker Coordinator (Leadplane)
ATF	Aerial Task Force
ATGS	Air Tactical Group Supervisor
ATP	Air Tactical Pilot
ATS	Air Tactical Supervisor
BIA	Bureau of Indian Affairs
BLM	Bureau of Land Management
CO	Contracting Officer
COR	Contracting Officers Representative
CWN	Call When Needed
DM	Departmental Manual (DOI)
DOI	Department of the Interior
ECC	Emergency Communication Center
FMP	Fire Management Plan
FSM	Forest Service Manual
FSH	Forest Service Handbook
GACC	Geographic Area Coordination Center
GPC	Gallons per 100 Sq. Feet (Retardant)
HIGE	Hover In Ground Effect
HOGE	Hover Out of Ground Effect
HLCO	Helicopter Coordinator
ICS	Incident Command System
IP	Initial Point
LPE	Leadplane Pilot Evaluator
MABM	MAFFS Airtanker Base Manager
MAFFS	Modular Airborne Fire Fighting System

Abbreviation	Description
MLO	Military Liaison Officer / MAFFS Liaison Officer
MOU	Memorandum of Understanding
NAO	National Aviation Office (BLM and USFS)
NICC	National Interagency Coordination Center
NIFC	National Interagency Fire Center
NPS	National Park Service
NWCG	National Wildfire Coordination Group
OAS	Office of Aviation Services
OFT	Operational Flight Training (Leadplane)
RAO	Regional Aviation Officer
RASM	Regional Aviation Safety Manager
ROSS	Resource Ordering and Status System
SAM	State Aviation Officer (BLM)
SEAT	Single-Engine Airtanker
SUA	Special Use Airspace
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service

Appendix A – Leadplane Phase Check Oral Questions

Phase 1

- What is the difference between an ATCO and a Leadplane pilot, and how are these positions identified in the ICS system?
- What is the role of an ATGS over a fire and how does this position interact with the Leadplane pilot?
- What is the role of an HLCO over a fire and how does this position interact with the Leadplane pilot?
- What is the role of an ASM over a fire?
- What is the role of an IC on a fire and how does this position interact with the Leadplane pilot?
- What is the primary role of the Leadplane pilot?
- What is the difference between the terms, required and ordered, as they relate to incident aerial supervision requirements?
- When is Leadplane required over a fire?
- When is an ATGS required over a fire?
- What is the purpose of the Leadplane coach program?
- What are the PPE requirements while flying a Leadplane mission?
- How often are Leadplane pilots required to attend recurrent flight and ground training?
- What is an FTA and how does it differ from a TFR?
- What is the standard procedure for entering and exiting the FTA for the Leadplane?
- At what altitude do you bring the tankers into the FTA? What factors might cause you to adjust this altitude?
- You are flying over a fire near the north end of Lake Chelan in Washington. Plot the fire location on a sectional. N 48 20 44 / W 120 43 14.
    - What information should you look for on the sectional prior to arriving over the fire?
    - Discuss the terrain around the fire and what conditions may exist over the fire.
    - Discuss the airspace over the fire.
    - What are some of your concerns about using retardant in this area?
    - What other frequencies should you monitor?
- What are the different types of power lines you may encounter on a fire and can you drop over or on power lines?
- What is the safest area to cross over a set of high-tension power lines?
- What is the minimum drop height for a large airtanker? What is the minimum drop height for a SEAT? Why do we have a minimum drop height?
- Can you drop next to crews on the ground?
- Describe coverage levels and how they are used.
- Is a coverage level 4 from a constant flow tank the same as a coverage level 4 from a doored tank?
- When would you brief an inbound tanker and what information would you give them?
- What is the purpose of a show-me run?
- Describe the information you would talk about with the airtanker on a show-me run.
- Describe ways you can join up with an airtanker.
- During a join up who has responsibility for separation?
- What should you do if you lost sight of an airtanker during the join up?

- What do you do in the event of an overrun?
- What is an IP and when would it be used?
- Discuss mountain flying weather, terrain, and techniques.
- What is the maximum angle of bank when exiting a run? Is there any time you can exceed this bank angle?
- At what point during the final approach to the drop area should you start to accelerate? When should you start to clean up the aircraft?
- What criteria should you use to evaluate a tankers drop? When should you give this evaluation?
- What are some possible distractions a Leadplane pilot might incur while operating over a fire?
- What are some conditions that may warrant shutting down airtanker operations?

Phase 2

- Discuss flight following policies and options when dispatched to an incident? How does this differ in Alaska?
- What is the transponder code that is used for firefighting aircraft? Would you use that code while enroute to and from the fire?
- Describe the differences between a variable flow, a constant flow, and a pressurized tank system.
- List each operational airtanker type and identify its tank system.
- Describe the variations between SEAT tank systems and their coverage patterns.
- Discuss the individual strengths and weaknesses of SEATs and heavy airtankers while building retardant line.
- Discuss the factors that might cause the coverage level on the ground to be different than the coverage level selected by the pilot.
- How can you manage your radios and what should you be listening to?
- How would you change the way you manage your radios when you are dispatched to California?
- What should you do while enroute to a fire?
- What information should you pass on when giving a fire size up?
- Who might you contact with a fire size up?
- Name the locations of the large airtanker bases in each state?
- What is the difference between a temporary and a reload base?
- What is an example of a retardant and a suppressant and what are the differences?
- What is the difference between fugitive and non-fugitive retardant, and where might they be used?
- What are some concerns with working helicopters and fixed-wing aircraft in the same area?
- What are some techniques in ensuring separation of helicopters and fixed-wing aircraft working in the same area?
- If you are diverted to a different fire, what information do you need to get from dispatch? What will be some of your concerns?
- What should you do in the case of an aircraft accident or ground personnel accident?
- Give some examples of anchor points and describe the use of them.
- What is a tactical frequency and how is it used on a fire?
- Describe natural fire breaks and how they are incorporated in the construction of retardant line.

- Discuss unique hazards associated with dropping over flat terrain.
- Describe the air and ground resources needed to control a small fire with a high rate of spread in grassy flat lands.
- Describe the air and ground resources needed to control a small fire with a high rate of spread in mountainous terrain with heavy timber.
- You are on final for a retardant drop and you notice crews working in the drop area that the ATGS said was clear. What do you do? What if a house was about to burn?
- When on a base leg for a retardant drop, another tanker calls 12 miles out. What are you going to tell the inbound tanker?
- What is considered a standard pattern for the airtanker? When would you use a non-standard pattern and what might be some of your or the tanker pilots concerns for using a non-standard pattern?
- You are on final for a retardant run when the airtanker says that they have a problem.
  - What would you do?
  - How can you help?
  - Should you follow the airtanker back to the tanker base?
- A drop is made and you see it is way off target. How would you discuss it with the airtanker crew?
- Identify some factors that influence when you would order relief.
- Discuss how you would brief a relief Leadplane arriving over your fire.
- What side of a fire line would you treat with retardant while supporting a burn out?
- You are working a fire which has made a run up the slope and is approaching the ridgeline. Where would you put the retardant?
- What problems will you have when mixing retardant drops and water drops to build line?
- Describe the difference between a simplex and a duplex frequency for the FM radio.
- Where would you find information for a specific airtanker base?
- What are the advantages or disadvantages of dropping retardant into the wind, with the wind, or crosswind?
- What are some of the difficulties and concerns when you fly a pattern that has a tail wind on base?
- What are some issues to be aware of during downwind drops in relation to groundspeed climb gradient, etc.?
- Discuss how the different airspace around an airport might influence your operations over a fire.
- Describe methods to maintain aircraft separation with a mix of airtankers over an incident.
- How do you determine the minimum visibility and wind speed while over a fire?
- Describe the difference between a fixed tank and bucket on a helicopter. How will this affect the type of dipsite they will need?
- Discuss the tactics for a fire that is spotting out in front of the head. How would you change your tactics if there were structures threatened?
- You have lost communications with the ground but can still talk with the airtanker. No one else in the air is having trouble communicating with the ground. Can you still make the retardant drop as planned?
- You are on final for a live retardant run when the frequency you are using for airtanker operations suddenly becomes congested with other traffic. What should you do?

- You notice a significant gap in the retardant load as it exits the airtanker. What could have been the cause and how might it be solved?
- What ways could you get a quick evaluation of the drop prior to flying back over the drop?
- What is the difference between a level 1 and a level 2 SEAT?
- What specific authorizations do you have after taking the certificate of waiver for the Grand Canyon Park Special Flight Rules Area training?

Phase 3

- You are over a fire with no ATGS and a media helicopter calls you wanting footage of the fire. Do you allow them over the fire? If so, at what altitude will you bring them in? Do they have the right to enter the FTA? Do they have the right to enter the TFR?
- You are over a fire with no ATGS and a law enforcement helicopter calls you wanting to evaluate the fire. Do you allow them over the fire? If so, at what altitude will you bring them in? Do they have the right to enter the FTA? Do they have the right to enter the TFR?
- Can general aviation aircraft come into an FTA or a TFR?
- What should be done if you have an intrusion in the TFR? What would you do differently if there was no TFR in place?
- You are on final with the airtanker preparing to drop a load of retardant when a ground crew calls and informs you that they are deploying their shelters and are about to get burned over. What do you do?
- List the locations of tactical air resources, fixed-wing and helicopters, in your region.
- How do you order more air or ground resources on a fire with an ATGS on scene? With no ATGS on scene? With no ATGS or ground resources?
- Describe a use of the guard frequency when you are over a fire with other aviation resources.
- You, along with a jump ship and three airtankers are dispatched to a fire. You are the first aircraft on scene. The jump ship is 3 minutes out and the airtankers are 5 minutes out. Describe what you are going to do and how you are going to coordinate the air resources.
- You are working with an ATGS on a fire. The ATGS requests that you take over air tactical duties while he goes in for fuel and lunch. Can you take over for the ATGS? If so, what information do you need to get from him prior to his departure? Who should you inform of this transfer of duties? What liabilities are you taking on?
- What are some of the concerns with mixing large airtankers and SEATs into the same pattern over a fire?
- What frequency should you monitor when you are flying near the Canadian border?
- Can a US Leadplane lead a Canadian airtanker in the US?
- Can a Canadian Bird Dog lead a US airtanker in the US?
- At what wind speed is it generally ineffective to drop retardant?
- What is the Grant of Exemption 392? Describe the terms and conditions of this grant of exemption.
- What are the general differences between the flight crew duty day and flight hour policy phase 1, 2, and 3 requirements?
- Can an ATGS direct a MAFFs aircraft for a retardant drop?
- When are Leadplane pilots required to attend MAFFS training?

- What are the cut off time parameters for large airtanker operations? How do the cut off times differ for single-engine aircraft? How do the cut off times differ for aircraft in Alaska?
- You have five airtankers over a fire and they are all released back to the tanker base due to excessive wind over the fire. How should you release them back to the base? What factors will you take into consideration?

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Appendix B – ATGS Refresher Training Exercise

The Goal of the ATGS refresher training exercise is to ensure the safety of aviation operations is retained as it pertains to the ATGS position.

The ATGS will demonstrate the following fundamental ATGS skills:

- FTA entry
- Determine and assign FTA altitudes for incoming aircraft
- Initial aircraft briefings
- Maintain vertical and horizontal aircraft separation
- Communication with air and ground resources
- Situational awareness

The exercise will be evaluated by an ATGS Final Evaluator utilizing the Aerial Supervision Mission Evaluation form.

Exercise objective: Demonstrate fundamental ATGS skills within 15 minutes.

Exercise elements and role players:

- Initial attack fire with the following resources:
  - On scene:
    - IC
    - One engine crew
    - One hand crew
  - Enroute:
    - 2 helicopters
    - 2 airtankers
  - Dispatch

Exercise sequence:

1. ATGS receives aircraft dispatch form with resource information and altimeter setting
2. ATGS launches from home base and establishes contact with dispatch.
3. ATGS initiates FTA entry procedures 12 miles from incident.
4. ATGS arrives on scene, makes contact with IC and establishes objectives and priorities. Fire elevation is indicated on sand table.
5. Enroute aircraft (airtankers and helicopters) check in at 12 miles.
6. ATGS provides initial briefing.
7. Aircraft arrive on scene; ATGS provides tactical briefing based on incident objectives.
8. ATGS coordinates helicopter work and retardant drops.
9. ATGS ensures line clearance during helicopter and airtanker operations.
10. ATGS solicits feedback from IC regarding helicopter and airtanker operations.
11. ATGS gives departure briefing or additional instructions to airtankers and helicopters.
12. End of exercise.

Exercise conclusion: ATGS and evaluator debrief utilizing the Aerial Supervision Mission Evaluation.

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Appendix C – Aerial Supervision Mission Checklist

Aircraft Mission Checklist
Aerial Supervision

Preflight

• Mission fuel	Confirmed
• Weather enroute/destination	Checked
• Resource order/mission brief	Accomplished
• Standard aircraft brief	Accomplished

After Takeoff/Enroute

• GPS	Set
• Communication/radios	Confirmed/set
• Other aircraft on scene/enroute	Confirmed
• Level of supervision on scene	Confirmed
• Alternate airport(s)	Confirmed
• Time on station (Bingo)	Determined **/Re-evaluate***
• Crew brief	Accomplished

Prior to FTA entry

• Altimeter	Set
• Pulse/ landing lights	On
• Transponder	On/ALT

***In the event of divert to a new incident, checklist items after "Preflight" will be re-done.**

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Appendix D – Fire Traffic Area Card

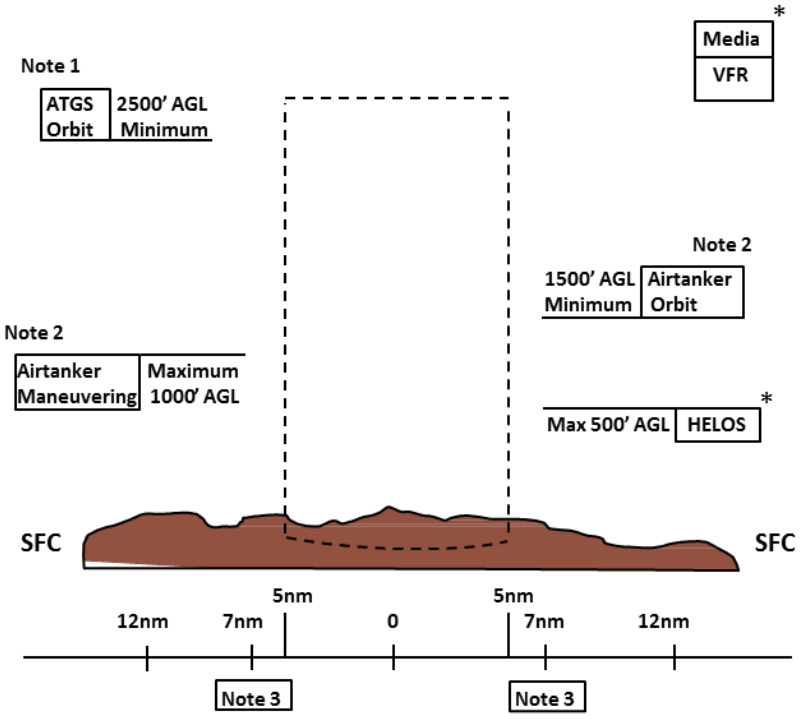
Fire Traffic Area (FTA) 09 Dec 2015

National Interagency Airspace: http://airspacecoordination.org

***** Clearance is required to enter the FTA *****

Initial Radio Contact: 12 nm on assigned air tactical frequency.
No Radio Contact: Hold a minimum of 7 nm from the incident.

Note: Airtanker maneuvering altitude determines minimum airtanker and ATGS orbit altitudes. Assigned altitudes may be higher and will be stated as MSL.



Note 1	1000' min. separation between ATGS orbit and airtanker orbit altitude.
Note 2	500' min. separation between airtanker orbit and maneuvering altitude.
Note 3	On arrival reduce speed to cross 7 nm at assigned altitude and 150 KIAS or less.

* Helicopters: Fly assigned altitudes and routes.

* Media: Maintain VFR separation above highest incident aircraft or position and altitude as assigned by controlling aircraft.

Airtanker Base	Air Guard	Air to Air	National Flight Following
As Assigned	168.625 Tx Tone 110.9	As Assigned	168.650 Tone 110.9 TX and RX

National Interagency Airspace: http://airspacecoordination.org

Incident Airspace Reminders

Fire Traffic Area (FTA)

- The FTA is a communication protocol for firefighting agencies. It does not pertain to other aircraft that have legal access granted by the FAA within a specific TFR.
- The FTA should not be confused with a TFR, which is a legal restriction established by the Federal Aviation Administration to restrict aviation traffic while the FTA is a communication tool establishing protocol within firefighting agencies.
    - Participating aircraft must adhere to TFR policies as established by the FAA.
    - For example, if the TFR boundary of a polygon exceeds the 12-mile initial contact ring, clearance will still be required in order to enter the TFR.
    - If the TFR boundary is within the 12-mile ring, proceed with standard FTA communication procedures.

Temporary Flight Restriction (TFR) - All assigned/ordered aircraft must obtain clearance into or the incident TFR by the on scene aerial supervision or the official in charge of the on scene emergency response activities.

- **A ROSS order or Aircraft Dispatch Form is not a clearance into a TFR.**
- Aircraft not assigned to the incident must stay clear of the TFR unless communication is established with the controlling entity (ATGS, ASM, Leadplane, etc.) and authorization is given to enter/transit the 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 **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 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.

Further Information: *Interagency Aerial Supervision Guide* (NFES 2544)

Appendix E – Standard Briefing Scripts

Establishing Flight Following

Flight Following Script

The following information is required every time you initiate flight following with dispatch.

- Call sign
- Departure location
- Number board
- Fuel on board (hours)
- Estimated time enroute (ETE)
- Destination
- AFF confirmation

The transmission is as follows:

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

"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."

Key points

- Always identify yourself as Air Attack, Recon, Jumper, Helicopter, etc.
- Always state the frequency you're transmitting on.

FTA/TFR Calls in the blind:

Calls in the blind Script

Receiving unit
Call sign
Location
Altitude
Intent
"Any traffic please advise."
Frequency

Example-"Ocho fire traffic, Air attack 0DT, 12 miles to the south west, 6500, inbound, any traffic please advise 122.925."

Table 11. Initial Briefing

Initial Briefing	Clearance Information		Aircraft in FTA		Mission Instructions					Hazards
	Altimeter	Clearance Altitude	ATGS Altitude	Other Aircraft Altitude	Coverage Level	Load Portion	Number in pattern	Location Needed	Contact and Frequency	En route Hazards
Airtanker	1	2	3	4	5	6	7	8		9
Lead/ASM	1	2	3	4				5	6	7
Helicopter/bucket	1	2	3	4				5	6	7
Helicopter/recon	1	2	3	4				5	6	7
Helicopter/logistical	1	2	3	4				5	6	7
HLCO	1	2	3	4				5	6	7
Scooper	1	2	3	4			5	6	7	8
Media Helicopter	1	2	3	4						5
Relief ATGS	1	2	3	4				5	6	7
Smokejumpers	1	2	3	4				5	6	7
IWI (fixed/rotor)	1	2	3	4				5	6	7

Clearance Information: This information is always the first and second parts of the Initial Briefing given to all aircraft entering the Fire Traffic Area. Read-back is required. Example: T-45, Altimeter 2992, Cleared in 7,500.

Aircraft within FTA: These are always the third and fourth parts of the Initial Briefing given to all aircraft entering the Fire Traffic Area. These are the primary hazards at this stage. Read-back is not required but incoming aircraft should report back when traffic is in sight. **Example:** "Air Attack at 8,500, 3 Helicopters at or below 6,500."

Mission Instructions: This portion of the Initial Briefings will vary by mission. Incoming Aircraft should declare mission if unknown (example: "H-27S, 12 miles out with IC on board for recon.") Read-back is required. Example: "Set up Coverage Level - 4, full load, you're number 3, Right Shoulder."

Hazards: This portion of the Initial Briefing is last and only includes hazards that could be encountered before the Tactical Briefing occurs in which specific hazards will be identified. These hazards are usually other aircraft that are departing the Fire Traffic Area but could include wires across canyons, wind farms or other general hazards.

Example: "Caution outbound Airtankers."

Initial Briefing Airtanker Example: "T-45, Altimeter 2992, Cleared in 7,500, Air Attack at 8,500, 3 Helicopters at or below 6,500, set up Coverage Level-4, full load, you're number 3, Right shoulder, Caution outbound Airtankers."

Initial Briefing Helicopter/bucket Example: "HT-793, Altimeter 2992, cleared in at or below 6,500, Air Attack at 8,500, Airtankers at 7,500 near the right shoulder, dip out of Lucky Peak Reservoir, daisy-chain with HT-718 in Division Bravo, ground contact Idaho City on Air-To-Ground 24, caution power lines."

Table 12. Tactical Briefing

Tactical Briefing	Define Objectives	Identify Specific Hazards	Target Description	Low-Level Clearance	Ground Clearance	Exit Routes
Airtanker	**1**	**2**	**3**	**4**	**5**	**6**
Lead/ASM	**1**	**2**		**3**	**4**	**5**
Helicopter/bucket	**1**	**2**	**3**	**4**	**5**	**6**
HLCO	**1**	**2**		**3**	**4**	**5**
Scooper	**1**	**2**	**3**	**4**	**5**	**6**
Smokejumpers	**1**	**2**	**3**	**4**		**5**
IWI (fixed/rotor)	**1**	**2**	**3**	**4**		**5**

Tactical Briefing example: "Tanker 45, establish an anchor at heel of the fire, right flank, caution power lines below the fire, (Target Description), cleared low level, ground is clear."

Table 13. Departure Briefing

Departure Briefing	Drop Evaluation			Return Instructions		
	Start	Line	End	Fuel/load and return/hold	Location	Special Instructions
Airtanker	1	2	3	4	5	6
Helicopter				1	2	3
IWI (fixed/rotor)						1

Drop Evaluation: Drop evaluation is typically done by the ATGS in for fixed-wing operations while the ground contact usually provides the drop evaluations for the rotor wing. Start is described as early, good, or late. Line is left, good, or right. End is only described on a roll-up/backward line construction or if a specific end point is desired otherwise end is N/A. Example: T-45, late start, good line, good tie-in to the road.

Return Instructions: Air Tankers are given Load and return instructions and the fueling is part of that when needed and is implied. Helicopters are given fuel and return instructions and they are typically only leaving the FTA to get fuel and their loads are obtained within the FTA. Location is given when a specific location is desired or as a confirmation of a normal routine. Special Instructions do not always apply but could include Initial Points for departure routes, Altitude and route restrictions for exiting the FTA and cautions for inbound aircraft. Example: Load and return Cedar City, exit east side of fire.

Departure Briefing example: T-45, late start, good line, good tie-in to the road, load and return Cedar City, exit east side of fire at 7,000’ until clear of the TFR.

User Notes

User Notes:

User Notes:

User Notes: