INTERAGENCY SINGLE ENGINE AIR TANKER OPERATIONS GUIDE

CHAPTER 1 – INTRODUCTION

I. Objectives. The objectives of the Interagency Single Engine Air Tanker Operations Guide (ISOG) are to:

A. Promote safe, cost effective and efficient aviation services in support of agency and interagency goals and objectives.

B. Define and standardize national interagency Single Engine Airtanker (SEAT) operational procedures.

C. Through standardization, facilitate interchange and cross utilization of agency SEAT resources.

D. Provide a common, interagency operational guide when working with SEAT contractors and agency air operations management.

E. Provide a framework within which Areas, Regions, States, and local units can provide supplemental agency specific guidance.

II. Scope. The standards and procedures contained in this guide apply to SEAT operations conducted by participating agency providers and users of SEATs.

III. Authority. The aviation Manuals of participating agencies contains the authority to publish this guide.

IV. Participating Agencies.

All federal SEAT contracts are administered by the Aviation Management Department of the Interior (AM). Program management responsibility is vested with Bureau of Land Management, U.S. Department of the Interior in accordance with lead agency concepts.

V. Reviews and Revision.

An interagency steering and standards committee consisting of representatives from agencies utilizing SEATs will periodically update this guide. Users are encouraged to recommend changes to this document through their respective aviation program managers.

VI. Publishing, Ordering and Distribution.

The guide and revisions are available through the NIFC Fire Cache in Boise, Idaho and web site (www.SEATops.com)

CHAPTER 2 - PERSONNEL

I. Introduction. This section establishes the qualifications, training, certification and currency requirements necessary to perform as a SEAT pilot, as well as the duties and responsibilities of the SEAT manager.

II. Pilot Qualifications, Certification, Currency, and Experience.

A. Pilot qualifications. All SEAT pilots must possess a FAA commercial pilot certificate and an FAA instrument rating for airplanes; hold a minimum of a Class II medical certificate issued under provisions of 14 CFR part 67. The pilot shall also have category and class ratings in the air tanker to be flown, or type rating if required, and shall meet FAR 61.56(a) and (c) as well as the "recent flight experience pilot-in-command" portions of 14 CFR 61.57(c).The pilot shall possess proof of qualifications to meet 14 CFR 137.53 for congested areas.

B. Pilot Certification. The USDOI-AM is responsible for inspecting and approving SEAT pilots for interagency use. The OAS uses an Interagency Pilot Qualification Card, a Aircraft Data Card, and a Service Truck Data Card to document this process.

C. Currency. In addition to the above, the SEAT pilot shall have at least 100 hours as pilot-in-command (PIC) in airplanes during the preceding 12 months, and a minimum of 10 hours as PIC in the last 60 days, and five takeoffs and landings in the make and model to be flown, in the preceding 12 months. When appropriate, currency flights (i.e. every 14 days during periods of no flight activity) may be authorized at the discretion of the agency for exclusive use and long term CWN operations.

D. Training. Prospective SEAT pilots will be given an initial training course that shall include but not be limited to the following:

-Fire Behavior
-Air & Ground tactical operations
-Incident organizational structure and terminology
-Fire perimeter designation
-Radio communications and procedures
-Use of retardants and suppressants
-The Policies & Procedures in this guide
- Other agency specific guidelines that may be applicable such as pilot training by bureau.

(EFFECTIVE 4/1/04) Pilots shall have taken and successfully passed the following courses which are available on the Internet at no charge:

1. SEAT Pilot Computer Based Training at http://www.aviation.blm.gov/airops.htmSEATs.
2. Aviation Radio Use (A-109) at http://iat.nifc.gov/online.asp
3. Flight Payment Document (A-111) at http://iat.nifc.gov/online.asp

In addition to the above, pilots not currently carded level I shall have successfully completed the following training available through the Bureau of Land Management:

!. National Training Course or Certified Training Syllabus
2. SEAT Pilot Academy

The pilot shall pass an agency administered oral examination of aerial firefighting terminology, tactics, and techniques. The determination as to the pilot's understanding of aerial firefighting terminology, tactics, and techniques to successfully meet the requirements of the contract will rest with the Government.

E. Flight/ duty hour limitations. All SEAT pilots shall comply with the section, Flight Crew Member Duty and Flight Limitations of the Call-When-Needed or the Exclusive Use contract Provisions, which stipulate that a maximum of 14 consecutive duty hours during any assigned duty period will be adhered to at all times. The pilot shall be given a minimum of ten consecutive hours of rest (off duty), not to include any pre-flight or post-flight activity, prior to any assigned duty period. During any 14 consecutive calendar days the pilot and driver shall be given 2 calendar days of rest.

F. Flight crew. Flight Crew will be limited to a maximum of eight hours flight time during any assigned duty period, and a maximum of 42 hours flight time during any consecutive six day period. When a pilot acquires 36 or more flight hours in a consecutive six day period, the pilot will be given the following calendar day off for rest, after which a new six day cycle will begin.

During times of prolonged heavy fire activity, the Federal agencies may issue a notice reducing the pilot duty day and/or flight time limits, on a local, regional, agency, or interagency wide basis.

III. SEAT Pilot carded Ratings. All SEAT pilots shall be rated and carded as

either a Level 1 or Level II based on the following criteria.

A. Level 1 Rated pilots.

The Level 1 rated pilot is qualified to perform SEAT missions during all complexities of fire air operations, with or without benefit of aerial supervision. This encompasses all missions from Initial Attack through the complex large fire aerial operations. The Level 1 rated pilot will be familiar with and have experience in complex aerial fire suppression methods, and therefore will be more effective in those types of situations. To qualify for a Level 1 endorsement, the pilot must meet either A or B below and have performed 25 loads on actual wildfires within the previous 36 months. These 25 loads shall be documented in the pilot's personal logbook denoting date, fire identification, controlling agency and a point of contact for verification.

(1) Complete the 25 fire missions (B3.1.8.1.2) under the supervision of an Air Tactical Group Supervisor (ATGS) or Airtanker Coordinator (ATC) or lead plane pilot, while operating in the incident airspace concurrently with three or more tactical aircraft. (SEAT +3 or more) The documentation shall include the ATGS/ATC name. The ATGS/ATC must be recognized by either the DOI or USFS.

(2)Have one of the following additional flight profiles:

(a) 200 hours within the last 24 months while designated as an air carrier pilot in command (PIC) for Instrument Flight Rules (IFR) conditions operating under a 14 CFR 121 or 135 certificate.

(b) 200 hours as PIC in the last 12 months of flight operations within high density airspace where multiple communication paths are utilized. Acceptability of this experience is to be determined solely by the Government.

(c) 100 hours as PIC (not to include instruction given) of actual instrument experience in controlled airspace within the last 12 months.

(d) 100 hours and one full season, to include at least 5 fires or one (1) extended attack large fire, as the primary Air Attack PIC, for a Federal Agency.

(e) 100 hours and two (2) seasons experience to include at least 20 fires or one extended attack large fire, as a flight crewmember on an air attack platform, airtanker, of smokejumper aircraft for a federal agency,

or cooperating state agency. (not inclusive of all states)

(f)100 hours PIC in the last 24 months of firefighting experience to include at least 20 fires in SEATs or large airtankers for a cooperating state agency or foreign government (not all inclusive) where operational control, communication plans, and pilot responsibilities are similar to the U.S. Federal SEAT program. Acceptability of this experience is to be determined solely by the government.

Refer to section B - technical Specifications, of the contract for further clarification.

Criteria used in issuance of the Level 1 card also includes the following: (1) the pilots' cooperation, professionalism and positive attitude toward accomplishment of the mission and aviation safety, (2) judgment in making fire suppressant material drops under diversified terrain and flight conditions, (3) consistent proficiency in making accurate drops, and (4) ability to operate in a multiple aircraft environment safely and effectively.

Personnel who perform ineffectively, refuse to cooperate in the fulfillment of the project objectives, are unable or unwilling to adapt to field living conditions, or whose general performance is unsatisfactory or otherwise disruptive or detrimental to the purpose for which contracted, shall be replaced by the Contractor. Pilots who fly recklessly or fail to follow safe operating practices shall be replaced by the Contractor. (C8.1.2) Pilots who consistently perform in the above manner may lose either their Level 1 or 2 status.

Level 1 Recurrency

(Effective 04-01-04) In order to maintain Level I status, each pilot is required to successfully complete the recurrency curriculum at the SEAT Pilot Academy within the previous 36 months.

Re-issuance of a Level 1 endorsement may be accomplished when a Level 1 endorsed pilot has satisfactorily performed on SEAT missions in the preceding 12 months. Pilots who have held a Level 1 endorsement but have not satisfactorily performed on actual SEAT missions within the previous 36 months may be reissued a Level 1 endorsement after completing a satisfactory review of SEAT operations. This review will be given at the direction of the OAS pilot inspector, and may be a combination of oral, written, or flight elements. Satisfactory performance includes, but is not limited to the criteria used in the initial evaluation for Level 1 endorsement.

Reinstatement of a Level 1 Endorsement

If more than 36 months have passed since the last Level 1 endorsement or satisfactory performance on actual SEAT missions, the pilot shall: (1) Satisfactorily complete the review described above, and (2) as a Level 1 pilot, demonstrate proficiency and knowledge on five drops (either in simulated or actual environments) that are supervised and documented as such by OAS. Flights for this reinstatement shall be accomplished at the convenience of the Government.

It is the policy of the SEAT program to only accept experience towards the Level 1 rating that has been acquired while performing under a Federal SEAT contract or an approved cooperating agency. The SEAT Program Manager will have the responsibility and authority of determining which programs are approved. This process will also involve input from the State/Regional Aviation Manager (SAM/RAO) where the prospective Level 1 pilot is working. Or in the case of a (CWN) contract, the SAM/RAO where the contractors' home base is located. The appropriate SAM/RAO will evaluate each request and forward it to the National Program Manager who will then review and forward the request to the OAS with recommendation whether to endorse or not.

It must also be remembered that the stated 25 fire missions is a minimum number. And that when a prospective Level 1 pilot has attained the specified number(25), there is no" automatic "upgrade to Level 1 status.

B. Level II Rated Pilots

Level II permits pilot performance of missions without benefit of aerial supervision in the fire environment airspace with the SEAT plus one other aircraft. With more than two aircraft on the scene, aerial supervision for the Level two pilot is required.

Approved pilots shall be designated a "Level II" based on the following:

Initial Level II Endorsement: In addition to meeting the initial requirements of the contract, the pilot will (1) exhibit a cooperative, professional and positive attitude toward the accomplishment of the mission and aviation safety, (2) understand the principles of making fire suppressant drops under diversified terrain and flight conditions, and (3) consistent proficiency in making accurate drops.

Re-issuance of a Level II Endorsement may be accomplished when a Level II

endorsed pilot has satisfactorily performed on SEAT missions during the preceding 12 months. Pilots who have held a Level II endorsement but have not satisfactorily performed on actual SEAT missions within the previous 12 months may be reissued a Level II endorsement after completing a satisfactory review of SEAT operations. This review will be given at the direction of the OAS pilot inspector, and may be a combination of oral, written, or flight elements. Satisfactory performance includes, but is not limited to the criteria used in the initial evaluation for Level II endorsement.

IV. SEAT Manager Position.

A. Introduction. In order to ensure adherence to contract specifications, safety requirements, and fiscal accountability, a qualified SEAT manager will be assigned to each operating location to provide for the the management of the operation

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The SEAT Manager will be allowed to manage up to three SEATs without the assistance of additional SEAT Managers or trainees provided all the aircraft are at the same location and orders have been placed for additional SEAT Managers through the established dispatch channels. Trainees may be utilized to assist in this operation only if they are under the direct supervision and daily contract of the assigned qualified manager.

B. SEAT Manager Duties and Responsibilities. The duties and responsibilities of the SEAT Manager are as follows:

Conducts a pre-use walk around inspection and completes inspection forms of the aircraft and ground support equipment, along with reviewing both the pilot qualification card and the aircraft data card to ensure the adherence to the specifications outlined in the Call-When-Needed, or Exclusive Use contracts.

Require the contractor personnel to demonstrate their ability to mix and load retardant and suppressants to manufactures specifications.

Require the contractor personnel to demonstrate their ability to safely fuel the aircraft according to the contract specifications.

Advises agency personnel regarding the need to relocate operations nearer the incident, thus providing a more efficient and cost effective air operation, and coordinates with the SEAT pilot regarding airfield/airstrip capabilities & limitations.

Performs as a liaison to the airport manager or airstrip owner, as well as coordinates with the local authorities for aircraft security.

Is responsible for the cleanliness of the ramp area, and ensures that all fuel and retardant spills are promptly cleaned according to established environmental and/or hazardous materials procedures. (This is a contractor responsibility except at designated bases, the SEAT managers' responsibility is to see that it gets accomplished).

Ensures that the operation adheres to the using agency guidelines and regulations, as well as continued compliance with relevant national requirements.

Ensures compliance with contractual stipulations in the Call-When-Needed and the Exclusive Use contracts and serves as the Project Inspector (PI).

Complete and preview contract performance evaluation with contractor.

Ensures that all flight time and duty day limitations are compiled for all contractor personnel as well as the pilot.

Performs as the liaison between the SEAT contractor and the using agency or unit.

Completes required administrative and operational forms as required by local aviation management. (See the SEAT Managers Kit for a list of required, as well as optional forms.)

Ensures that the contractor completes records and reports as required by the using agency.

Conducts an initial pilot briefing utilizing the guidelines established in the “Initial Pilot / Manager Briefing” available in the NFES SEAT Forms Packet.

Conducts daily briefings and debriefings with the pilots, other contract personnel and government employees assigned to the operation.

Ensures the SEAT pilot receives a complete mission briefing, prior to departure.

Is responsible for regulating all aircraft and motor vehicle movements

on and around the SEAT operations base.

Ensures that all required radio frequencies are programmed into the SEAT radios and are operating according to specifications.

Establishes communications needs at the base of operations and ensures that all base radio equipment is maintained in working order.

Verifies radio frequencies on a daily basis, as well as receiving and relaying orders for/ from dispatch and for/from tactical aircraft.

Ensures flight following and if applicable, resource tracking is performed, and performs a pre-flight radio check. Will notify the proper authorities of any overdue or missing aircraft.

Monitors contractor personnel for compliance with flight time, driving time, and duty day limitations as contained in the procurement document, and completes cumulative logs for contractor personnel.

When required by contract or if the aircraft is utilizing an established SEAT base, will supervise agency personnel as well as contractor / cooperators in the proper and accepted aircraft loading procedures.

Monitors and documents density altitude downloading of retardant loads in aircraft.

Notifies fire management staff when SEAT retardant load goes below minimum effectiveness level (300 gallons).

Maintains SEMG kit as listed in ISOG including forms package.

Develops and maintains inventory of alternate operation locations in conjunction with fire management staff and flight crews.

Ensures retardant quality in mixing and testing to specifications prior to loading of aircraft by monitoring the refractometer readings documented by the contractor and conducting periodical assurance checks.

Documents the refractometer readings taken by the contractor on the SEAT Tanker Log / Cost Summary Sheet (SEAT-006)

Ensures retardant lot quality acceptance by routing samples

accordingly.

Completes and reviews with all SEAT base personnel the Incident Action Plan and local Aircraft Incident/Accident Response Plan within the first 24 hours of operation.

Ensures that the contract daily dairy is completed for each operational period and distributed biweekly to the appropriate contract officers.

Reviews local aviation plans with flight crews.
Reviews local geographic potential aerial flight hazards with flight crews.

Coordinates with the local airport authorities any special takeoff, ramp, or landing requirements.

Operations from Large Air Tanker Bases

The Air Tanker Base Manager is responsible for coordinating with the assigned SEAT Manager concerning all aspects of SEAT operations at the base.

During operations from large air tanker bases, the *SEAT* manager will coordinate with the air tanker base manager regarding any separate loading and refueling areas or procedures in the event that SEAT loading is required to be separated from large air tanker retardant loading operations.

If the SEAT is being loaded with retardant from established pits, the SEAT manager will coordinate with the air tanker base manager to ensure that the appropriate separation from other aircraft is maintained.

The Air Tanker Base Manager is responsible for ensuring the SEAT Manager receives refractometer reading documentation for each load of retardant ensuring compliance with manufacturer's specification. (The SEAT contractor by contract, is required to maintain documentation of refractometer readings).

The Air Tanker Base Manager will perform logistical coordination, including but not limited to securing adequate supplies of foaming agents, retardant and water availability, providing rest and shaded areas, lodging and meals, and providing ground transportation for the contractor when required.

The Air Tanker Base Manager will ensure the readiness of all assigned aircraft and air crews, as well as being responsible for the safety and welfare of all personnel working with the SEAT operation.

The Air Tanker Base Manager must be thoroughly familiar with and enforces all safety requirements of the operation.

When appropriate the SEAT Manager will submit agency Safecoms in a timely manner through the proper channels.

The Air Tanker Base Manager will take immediate steps to assign trained personnel and secure proper equipment to perform SEAT operations safely and efficiently at the Large Air Tanker Base.

The Air Tanker Base Manager coordinates all SEAT assignments through the local dispatch organization.

SEAT Manager obtains a daily or more frequent briefings from one or all of the above regarding mission priorities, quality of retardant, drop effectiveness, or any other problems or concerns that may arise.

SEAT Manager ensures that all administrative forms and reports are completed, including time and use reports, and payment documents and provides aircraft use and cost information to the local aviation manager.

For incidents to which a Type I or Type II incident management team has been assigned, the SEAT manager will summarize all tactical use of the SEAT on the using agency's required form.

When a SEAT is located at a large Air Tanker Base, the tanker base manager will be responsible for ensuring the safety and contract compliance of the SEAT until the assigned SEAT manager arrives.

C. ***SEAT Manager Training and Experience.*** *SEAT Manager training is being conducted by authorized cadre experienced in SEAT operations. SEAT Manager is a NWCG red-carded position. After satisfactory completion of the nationally approved SEAT Manager training course, a prospective manager will serve as a trainee until it is determined that he or she is performing at the required level and providing the appropriate supervision. This shall be reflected in a properly documented task book. To maintain red card currency a SEAT Manager is required to attend an approved SEAT Manager workshop bi-annually.*

Required Training	*Single Engine AirTanker Manager (S-273)* *Basic Air Operations (S-270)*
Additional Training which supports development of knowledge and skills	*Introduction to ICS (I-100)* *Dispatch Recorder (D-110)* *Firefighter Training (S-130)*
Pre-requisite Experience	*Satisfactory position performance as a Single Engine Air Tanker Manager (SEMG)*
Physical Fitness	*None*
Other position Assignments That will maintain currency	*Helicopter Manager, Air Tanker Base Manager, and Fixed Wing Base Manager*

Desirable experience for entry level SEAT Manager training includes aircraft specific radio operations and communications, aircraft dispatching procedures, fixed-wing base management, airtanker base management, and mixmaster.

D. SEAT Managers Kit. The operational SEAT Managers kit should include, but not be limited to, the following:

Interagency SEAT Operations Guide
SEAT Manager Reference Text (includes forms package)
Aviation Technical Assistance Directory
Fire/Aviation Telephone Contact Directories
CWN SEAT Contract/Exclusive Use Contracts
National Mobilization Guide
Aircraft Radio and Communications Frequency Guide
National Long-Term Fire Retardant Requirements Contract
Density Altitude Chart (recommended)
Interagency Aviation Mishap Response Plan
Aircraft Use Reports (OAS-23's and User Guide)
Contract Daily Diaries
Contract Performance Evaluations
SAFECOMS

Initial Pilot/Manager Briefing
SEAT Pre-Use Information Worksheet (SEAT-001)
SEAT Aircraft / Support Vehicle Pre-Use Inspection Sheet (SEAT-002)
SEAT Pilot Flight Time / Duty Day Log (SEAT-003)
SEAT Fuel Truck Duty Day Log (SEAT-004)
SEAT Mechanic Duty Day Log (SEAT-005)
SEAT Tanker Log / Cost Summary Sheet (SEAT-006)
Pocket Calculator
Pens and Pencils
Note Pads
Flashlight
Clock and/or Wrist Watch
Eye Protection
Ear Protection
Hardhat and fireline clothing
Programmable VHF-FM

Recommended:
VHF-AM Hand Held Radio
Cell Phone

V. SEAT Coordinator (SECO) Position:

A. Introduction. The SEAT Coordinator position was developed to be mobilized at a state or regional level to help coordinate SEAT operations within a geographical area.

B. SEAT Coordinator Duties and Responsibilities:

Performs as a liaison between the agency and the SEAT base of operations. Reports directly to the agency's state or regional level aviation managers, when assigned to a specific area of responsibility.

Performs base inspections in the field using the standard SEAT Base inspection form developed for Pre-season or Readiness Reviews. Provides assistance in rectifying any discrepancies, offers recommendations to improve safety and operational efficiency.

Performs area inventory of possible remote SEAT bases. Compiles a listing of each prospective base of operations, listing the location, local contractors and phone numbers, latitude and longitude, length, width, and composition of the landing surface. Provides a list of all the facilities and identifies those that would be available for use by the agency for SEAT operations.

Identifies any restrictions or possible limitations of each site.

Provide procurement officer with general information to help them establish agreements with local contractors for water, equipment, and supplies that may be needed for the SEAT operations. Assists the agency personnel with developing agreements or Memorandums of Understanding (MOU) for the use of airports or airstrips. (The SECO does not have the authority to procure any contractors or make any agreement for rental or lease.)

Performs an evaluation of the SEAT Manager and the base operations. Offers assistance and recommendations to the SEAT Manager to provide a more efficient and effective base of operations.

Has the authority to "sign off" specific tasks within the guidelines of the SEAT Manager Task Book.

Provides input to the SEAT Manager to help them complete a contractor performance evaluation of the SEAT pilot and support personnel.

Assists agency unit aviation managers with deployment and movement of SEAT resources, including recommendation of types or resources to be deployed.

Identifies the capabilities and limitations of the resource that are available for deployment. Receives a briefing from the state or regional level aviation managers on the coordination of SEAT resources involving MAC groups.

Assists the using agency with finding available SEAT Managers and temporarily fills in for SEAT Managers on their days off when necessary.

Can act as a liaison for the contractor to help identify and resolve concerns or conflict issues that may surface between the contractor, the SEAT Manager or the using agency. Conflicts or concerns will be documented and reviewed with the Contracting Officer Representative (COR) or the Contract Officer (CO).

Compiles a comprehensive report on all SEAT operations that were reviewed within their assigned geographical area. The report will contain evaluations of contractor performance, SEAT base operations, SEAT Manager evaluations and the agency's utilization of the SEAT in their fire program.

Serves as instructor cadre member when requested for the SEAT Manager's course.

C. Qualification Prerequisites:

Must be a currently qualified SEAT Manager with a minimum of five (5) years of experience as a SEAT Manager.

Must be qualified as Strike Team Unit Leader or above.

Must be qualified as either Air Tanker Base Manager, Fixed Wing Base Manager, Helicopter Manager, Air Support Group Supervisor or above.

D. Experience Requirements:

Must have successfully performed as a SEAT Manager for a period of five years.

Must have successfully performed as a trainee SECO under the direct supervision of a current and qualified SECO.

CHAPTER 3 - OPERATIONAL PLANNING

I. Introduction. It is essential that all aviation operations be planned with the utmost consideration given to safety. All SEAT missions can be accomplished safely, provided that a high degree of pre-planning, risk management, and hazard analysis be applied. This chapter will discuss areas that must be addressed and actions that must be taken during the flight planning process. This chapter will also discuss the types of missions that SEATs will be asked to perform, along with the mission specific requirements and responsibilities pertaining to the contractor/ contractor and the user agency.

SEATs have consistently proven to be very effective as initial attack fire fighting resources, if utilized correctly. In order to be truly effective, these aircraft need to be an integral part of the overall initial attack strategy. This is especially true during extreme fire conditions and in the lighter sage, brush, and grass type fuels. Carrying an average of 500 gallons, these aircraft can often extinguish a new starts by themselves, if used quickly and effectively. In addition, these aircraft are capable of splitting their load. Recently, this effectiveness has been improved with the introduction and use of chemical retardants. There are many logistical and tactical advantages in the proper use of SEATs. Although very mobile, they do require some pre-planning and careful management consideration should be given to their deployment. Being capable of operating from remote airstrips, these are best used as a temporary solution. Logistical and operational issues may even preclude the use of some base locations. Any long term stationing of SEAT operations would best serve the user from an improved airport facility. These should be carefully chosen with the fire potential for the area as a prime consideration.

The SEAT Manager is responsible for ensuring that the pilot receives a complete mission briefing prior to departing the SEAT base. The mission briefing will include the following items at a minimum:

- *Incident name and elevation*
- *Lat / Long and/or bearing and distance*
- *Both AM and FM radio frequencies and contact assigned to the incident*
- *Additional aircraft ordered or at the incident*
- *Any known aerial hazards*
- *Airspace de-confliction concerns*
- *Location of the re-load base*

Note: All items for the pilot mission briefing can be documented on the "Aircraft Dispatch Form" NFES #2657, NIFC 9400-31. This form was developed as a self duplicating form that allows the SEAT Manager to document critical information needed for a mission briefing and provide the pilot with a carbon copy.

II. Types of Flight Missions.

A. Ferry flight or repositioning of aircraft. This entails the movement of an aircraft from one location to another for the purpose of positioning that aircraft at a specific location or returning the aircraft to its home base. This does not include any mission type flights. Typically, the flight originates at one SEAT base or developed airport, with the flight route being direct to another SEAT base or developed airport. The flight is conducted solely for the purpose of transportation, and the aircraft is usually flown empty.

B. Initial Attack Missions. This is the control effort taken by the first resources to arrive at the incident. This is typically the suppression effort that takes place during the first burning period, the initial phase of the suppression effort. Most often this is where the SEAT is sent to a reported fire and begins the suppression activity, often without other aerial resources either assigned or over the fire. The complexity of the air operation during the initial attack phase is generally low, however the initial attack phase can be the most challenging, as the fire command system is in the building stage and standardization of operating procedures is still to be established.

C. Extended Attack Missions. This is the control effort taken when initial attack activity has been expanded into the second full burning period, or when the initial attack resources assigned were insufficient to suppress the fire. The complexity of the air operation during the extended attack phase is usually higher. There may be several aircraft assigned to the fire organization and the level of supervision will also be higher.

D. Fire missions within an Incident Management Team Structure. This is the control effort taken when both the Initial Attack and Extended Attack resource capabilities have been exceeded. This phase of the fire suppression effort has the most complex level of air operations, with multiple types of air resources assigned, as well as several layers of supervision. The airborne communication complexity is also increased because of the multiple frequencies required.

During all mission flights, the anti-collision strobe lights shall be on while making the retardant drops. The landing lights shall be on while in the fire

environment unless prohibited by aircraft limitations.

The required support equipment will be located at the same base of operations as the SEAT, unless otherwise agreed upon before hand, by both the contractor and the aviation manager of the using agency. The SEAT manager will coordinate the movement and setup of the support Equipment.

E. Day/Night Flight limitations. As single engine aircraft, SEAT operations are limited to flight during the official daylight hours. Daylight hours are defined as 30 minutes prior to official sunrise until 30 minutes following official sunset, and under visual flight rule conditions.(FAR part 91.151 through 91.159) Caution must be taken in mountainous or hilly terrain. One 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 or Leadplane because of low visibility conditions caused by smoke, and/or shadows.

F. Flight over congested areas. All SEAT flight operations must comply with the Federal Aviation Regulations concerning flight over congested areas. These are stipulated in FAR part 91.119(b) and FAR part 137.51 and 137.53. All SEAT missions shall comply with FAR part 91 during all flight operations, except when over the fire itself, then all SEAT operations shall comply with FAR part 137. USDA-FS policy, the Airspace Guide, and the BLM Fire Ops Guide all require a lead plane for low level retardant operations over congested areas.

G. Proficiency Flights. During time of low fire activity the using agency should consider allowing flight time for a currency or proficiency flight. Proficiency flights should be allowed if there has been no flight time during a ten (10) day period. Proficiency flights should be conducted as an overall training exercise for all aspects of a SEAT operation including the dispatch procedures, loading operations, ramp management and flight following communications.

III. Obtaining Aircraft. SEAT aircraft are to be procured the same way as all other contractor supplied aircraft services. Acquisition of contractual services for SEATs will be in compliance with all national and regional mobilization guidelines, using the appropriate dispatching procedures as set forward in those documents.

A. Call-when-needed contracts. Obtaining SEAT services on a call-when-needed basis can be accomplished by complying with the normal

CWN ordering procedures, which are outlined in the National Mobilization Guide. Contacting the contractor directly should only be done for local contractor call out.

B. Exclusive Use Contracts. Exclusive use SEAT contracts are administered by the USDOI-Aviation Management or the USDA-FS , and requested through their respective National Aviation offices in Boise Idaho.

Each SEAT contractor shall be supplied with either the Call-When-Needed or Exclusive Use contract specifications that apply. The SEAT contractor will be required to carry the Call-When Needed or the Exclusive Use contract, whichever applies, with them in the aircraft or in the support vehicle.

IV. Preparing for SEAT Operations

Well in advance of ordering SEAT aircraft, FMOs and Aviation Managers should use the following checklist to properly prepare for SEAT operations:

A. Funding. Pre-suppression, Suppression, or Severity funding. Costs include:

Aircraft Daily Availability	SEAT Manager Workmonths	Airbase Facility
Aircraft Mob/ Demob (CWN)	SEAT Manager Travel/per diem	Water Source costs
Training/Proficiency Flight Time	SEAT Manager vehicle	Retardant/Foam Costs
Tanks, Pumps, Hose, Fittings, etc.		

B. Facilities. Designate and develop the base of operations. Monetary or non-monetary agreements may have to be made with City, County, State or private entities. Consider alternative, temporary or remote airstrips also. Secure arrangements for the following:

Ramp Space/ Tie downs	Office/Lounge Enclosed space	Restrooms

Water source	Phone and/or Radio installation	Security
Retardant storage/ loading	Taxi & Airport Pattern procedures	Garbage
Vehicle parking	Chemical/Fuel spill	

C. ***Aircraft Management***. Before a SEAT is utilized there must be a trained and qualified SEAT Manager in place. The SEAT Manager should become part of your organization; they should be supervised by an Aviation Manager, if possible. SEAT Managers shall be ordered through the established dispatch channels.

D. Operational Planning. A local SEAT Operations Plan should be developed and written to include the following:

Priorities for use (ie. initial attack, urban interface, priority areas, fuel types, etc.)

Constraints on use (waterways, wilderness, distance from base)

Guidelines for moving SEAT operation to remote bases (mobility)

Dispatch procedures, flight following, aerial supervision requirements, local aerial hazards

SEAT Use Training for dispatchers, fire crews, etc.

Type of retardant/suppressant (powder/liquid/foam; fugitive vs. non-fugitive)

SEAT Base Operations Plan & Aircraft Incident/Accident Response Plan in place within 24 hours of base set up

Chemical or fuel spill containment/disposal/reporting procedures

Retardant storage and transportation procedures

Aviation contacts: local Aviation Manager, State/Regional, Aviation Management

Paperwork requirements and procedures: OAS-23, diaries, logs, receipts,

stats, etc.

Briefing & package for SEAT Module: maps, frequencies, org charts, phone #s, ops plans

E. Aircraft Ordering. Order a SEAT on a standard Aircraft Resource Order through the dispatch system; ***at least 3 days prior to needing it***. Order a SEAT Manager (if you don't have one on your unit) on a standard Overhead order. Don't forget to order retardant and secure a water source!

F. Availability. The contractor personnel are required by contract to be available a minimum of nine (9) hours each day or as scheduled by the government.

G. Meals. The contractor personnel need to be prepared to provide their own lunch during operations. The government may provide lunch if they deem it necessary for their operation.

H. Lodging. The government, at its option, may provide lodging which may be a remote field or fire camp accommodations.

I. Jettison Areas. At any time other than required by emergency, SEATs are not to land loaded.

The using agency is responsible for designating jettison area for all SEAT bases. The location of the jettison area will be relayed to the SEAT Manager and the contractor.

CHAPTER 4 - FLIGHT FOLLOWING, RESOURCE TRACKING AND COMMUNICATIONS

I. Introduction. Flight following, resource tracking, and communications are key elements in promoting aircraft mission safety and efficiency. Flight following, whether performed from a dispatch office or other facility, must be given a high priority by all personnel involved.

The purposes of flight following and resource tracking procedures are to:

A. Ensure the safety and welfare of the flight crew

B. Promote effective utilization of aerial resources and resource tracking

C. Provide information for the administrative processing of aviation related documents.

Pilots, dispatchers, and SEAT managers must be knowledgeable in the differences between flight following and resource tracking, and of the different methods and options available to accomplish the task. It is understood that frequently the two intermix (for example, a flight following check-in accomplishes resource tracking, and vice versa).

1. Definition of Flight Following. Flight following is the knowledge of the aircraft location and condition with a reasonable degree of certainty such that, in the event of mishap, those on board may be rescued quickly.

2. Definition of Resource Tracking. In order to facilitate cost effective use of aircraft and planning of resources, scheduling offices and ordering offices may request flight status information at designated intervals.

II. Flight Following.

A. Flight following requirements. At the time the flight is planned or during the morning briefings, flight following procedures and requirements should be clearly identified by the dispatcher, unit aviation manger, SEAT manager, or other responsible party. This individual should identify check-in procedures, including time and locations, dispatch office(s) or other facility involved, individuals responsible for the check-in, frequencies to be used and any special circumstances requiring check-ins.

B. Methods of flight following. There are several methods of flight following, including but not limited to the following:

1. A Visual Flight Rules (VFR) Flight plan with radio check-in to an FAA facility or agency dispatch office at intervals specified. This method is most often utilized for Ferry flight/ point to point missions,

2. An agency VFR flight plan maintaining contacts at intervals specified in the flight plan, but not to exceed agency minimums.

C. Documentation required for flight following. The following requirements apply to agency flight following only, and are not applicable to flight following performed through the FAA system.

1. Dispatch flight following log. Flight following from dispatch offices is accomplished utilizing local forms and procedures.

2. Mission Flight following logs. A mission flight following log shall be used for all flight following during fire operations. The SEAT manager or the local fire dispatch office will be responsible for these logs.

D. Flight following check-in facilities.

1. FAA flight following. If on an FAA flight plan, check -ins are made with the FAA facility upon departure, while en route, and at the destination.

2. Agency flight following. Check-ins may be made with either the dispatcher or with trained personnel or other aircraft at the fire site (e.g., Air Tactical Group Supervisor, helibase at the fire, Incident Commander, etc.). When field flight following is approved, ground personnel performing the flight following must have contact with dispatch to allow timely reporting of any mishaps, or problems encountered.

E. Flight Following and Resource Tracking options and Requirements.

1. Check-in Requirements. Check-ins differs between point-to-point type flights and mission type flights.

a. Point-to-point/ ferry reposition flights. Check-ins are made at intervals not to exceed 60 minutes, or follow FAA VFR flight plan

requirements with check-ins at each stopping point en route and at final destination.
b. Mission flight. Check-ins shall be made as follows. Unless alternative flight following intervals have been identified in advance for areas of incomplete coverage or due to valid mission requirements, check-in at intervals not to exceed fifteen (15) minutes are the standard.

Check-ins are to be made prior to and immediately after takeoff and landing. This is to establish secure communication and to ensure correct frequencies are being used, but should not conflict with sterile cockpit procedures.

F. Check-in information. The check-ins made by the pilot for mission flights shall consist of:

1. Current location (geographic location and/or latitude and longitude by GPS are acceptable)
2. Current direction of flight. (use compass heading)
3. Destination of flight

G. Failure to meet Check-in requirements. The dispatch or other flight following facility shall immediately implement emergency response procedures for overdue or missing aircraft.

III. Resource Tracking.

On point-to-point/ ferry flights, the dispatcher may require the pilot to make resource tracking check-ins, usually by telephone, at en route stops and at the final destination.

IV. Communication Requirements. It is important that a line of communication be established and maintained throughout the aviation and dispatch organizations. Communications at all levels should be encouraged to resolve situations before they become a problem.

A. Local units should ensure that the existing communications network is adequate to meet both fire and agency needs. All personnel involved, must be furnished, and the aircraft must be equipped with sufficient radio capabilities and maps to meet the safety objectives.

B. The pilot is required to carry sectional aeronautical charts of the area of operations.

C. All carded aircraft shall be equipped with agency compatible radios, with tone guard capabilities. Tones have been established to reduce interference and allow the selective use of more frequencies.

D. General considerations. Operations must not be conducted if flight following requirements cannot be maintained. Aircraft with avionics problems that do not allow positive communications must return to the base for repair until the problem is rectified. Also, a review of the Communication plan shall be conducted during the daily briefing, ensuring that all personnel and pilots are aware of frequencies to be used, flight following requirements, and any changes to the operational procedures. Ensure that any problems are brought to the attention of the air operations staff and the communications unit, as well as the local aviation manager.

V. Incident Communications Plan and Frequencies.

During complex air operations, there are no standard communication plans that will work for all situations and for all agencies. For this reason, the following is a general discussion of air operations communications in term of function, requirements, options, and radio discipline. On an incident or project, the number of air operational communications functions is dependent upon the complexity of the situation. A good source of help in these situations is the NIFC Aircraft Radio and Communications Frequency Guide and the Incident Aviation Communications functions and Frequency Guide.

A. Flight Following and SEAT Base Air Traffic Control. This function is commonly called the "base" frequency. This frequency is used to coordinate the departing and arriving aircraft at the base of operations with the fire air operations personnel and the local dispatch office. This frequency is often used as the local flight following frequency, and will perform the flight following function for the SEAT during mission flight operations.

B. Air-to-Air Tactical Communications and Frequencies. Air-to-Air frequencies are used by all tactical aircraft over the fire during mission flights. The Air Tactical Group Supervisor (ATGS) and the Helicopter Coordinator (HLCO) use this frequency primarily to coordinate aerial activities. On large fire incidents or projects, airplane and helicopters many have separate frequencies. These frequencies will be part of the overall communications plan.

C. Air-to-Ground Tactical Communications and Frequencies. These

frequencies are to be used to coordinate aerial activities with the ground activities. All SEATs should have radio compatibility for this function.

D. Command Communications and Frequencies. There is usually only one Command Frequency assigned, although there may be more than one on large complex fire incidents. This function is used to link the Incident Commander with the air operations staff and ATGS. Its use should be limited to "overhead communications" and should not be used for other traffic unless during an emergency.

E. Air Guard Communications and Frequency. Air Guard is a national frequency with specific designated uses, such as emergencies, initial contact at an incident by inbound aircraft, and long range dispatch or rerouting. At no time shall Air Guard be an assigned frequency, nor shall it be used if other frequencies become overloaded, but must be monitored at all times.

F. Communication Requirements and Options.

1. Frequency compatibility. It is essential that all aircraft and ground personnel have compatible radios and frequencies in order to perform needed communication functions.

2. Radio Traffic and Radio Discipline. Radio traffic must be disciplined and concise. If problems are encountered with overloaded radio frequencies, first examine whether radio discipline is being practiced. If not, take corrective action with the pilots, aircraft managers, base personnel, and dispatchers. If the frequencies remain overloaded, then additional frequencies will be needed.

a. Use the following guidelines in managing radio traffic:

Use clear text on all operations, no CB language.

Keep messages brief and to the point.

If the message is long, use frequent breaks to allow other or emergency messages to be transmitted.

If a frequency has been designated for a specific function, do not allow radio traffic unrelated to this function on the frequency.

When making a radio call, identify the radio or frequency on which the message is being transmitted. Since pilot and ground personnel are monitoring more than one frequency, this will enable them to identify which radio or frequency to use to respond.

b. Frequency Monitoring. SEAT pilots can usually only monitor two frequencies effectively; one am & one fm, plus guard. Experience has shown that the lesser the number of frequencies that need monitoring, and the fewer the people that the pilot is receiving direction from, the better the pilot will function. Understanding will increase and fatigue factors will lessen.

c. Switching Frequencies. The necessity to manually switch frequencies will sometimes adversely affect the SEAT pilot. Due to the normal short turnaround times of SEAT operations, frequency changes are a source of distraction, and increase the already heavy workload. The use of AM frequencies should be encouraged whenever possible, as it is easier to change frequencies.

d. Combine Functions. On smaller or less complex incidents, communication functions can be combined. A common method is to combine helicopter air traffic control, air-to-air traffic control, air-to-air tactics, and flight following on one frequency. Command, air-to-ground tactics and support are often combined on another frequency. The biggest drawback to combining functions is the resultant increase in radio traffic on each frequency, making this option usable only when complexity is very, very low.

e. Air traffic information and Advisories. Safety is dependent upon adequate air traffic information and advisories being given, and that the information is received and acknowledged. Remember that interpretation can vary. Monitor traffic for compliance.

In most situations the pilot needs to know the following information:

Which aircraft are affected by the advisory
What type of traffic (helicopter, fixed-wing)
What the traffic is doing (turning, climbing, descending)
Location of the traffic.
Direction of travel

This is information usually provided by airport unicom, if available. If it is, duplication infringes on the sterile cockpit environment. This is critical for safety. SEAT pilots may not receive the information due to being involved in other radio traffic, on other frequency, their location, or other considerations.

CHAPTER 5 - SEAT AIRCRAFT REQUIREMENTS, CAPABILITIES AND LIMITATIONS

I. Introduction. It is essential that the SEAT users gain at least a rudimentary knowledge of SEAT capabilities and limitations. The brief summary in this chapter should be supplementary to basic Air operations and safety training that provides further specific information concerning SEAT limitations and operating characteristics. SEAT users and SEAT managers alike are encouraged to enhance their knowledge and understanding of SEAT operational capabilities by conferring with the individual most qualified, the pilot.

II. SEAT aircraft performance standards. The performance of each particular airplane will vary by aircraft type. They range from carrying 400 gallons of retardant/suppressant to the ability to carry 799 gallons of retardant/suppressant. The speeds of these aircraft will also vary depending on aircraft type and the amount of load being carried. The aircraft may be slower when loaded depending on atmospheric conditions.. They range in cruise speeds from 100mph to 200mph. However the majority of SEATs have a cruise speed around 145-165mph.

III. Aircraft Equipment, Communications and Instrument Requirements. All SEAT aircraft shall have either a standard or a restricted category airworthiness certificate, and be equipped with all fire fighting equipment as specified in the contract. All carded SEATs shall have the ability to carry a minimum of 300 gallons of retardant to typical operating altitudes with 90 minutes of fuel on board.

The contractor shall be currently certified under FAR Part 137, Agricultural Aircraft Operations. Surplus or previously type certificated military aircraft will not be used in this program.

Each aircraft in this program shall be equipped as required by FAR 91.205, for flight under Visual flight rules, daylight hours. In addition, a gyroscopic rate-of-turn indicator, slip skid indicator, gyro-stabilized or vertical card magnetic compass and a rate-of-climb indicator shall be installed, operable, and airworthy. Also each aircraft shall have installed and operable, a free air temperature gage, and landing lights. Each carded aircraft shall be equipped with a mode C transponder.

For loading of retardant/ suppressants, the aircraft shall have a single point loading system that allows the aircraft to be loaded from behind the trailing edge of the wing, and equipped with all the fittings required by the specifications of the contract.

A. Avionics Requirements. In order to provide adequate communications capabilities each SEAT shall be equipped with a minimum of one 720 channel VHF-AM aeronautical transceiver, operating in the 118.00 Mhz to 135.975 Mhz band on 25-Khz channel increments, with a minimum of five watts carrier power output. Also. each aircraft shall have installed and operable, one VHF-FM transceiver, operating in the 150.000 to 174.000 Mhz band on five Khz channel increments, 32 channels sub-audible tone encoder capability and no less than five watts and no more than 10 watts carrier power output. (King 985, Wulfsburg, or Technasonics radios are acceptable) All models must be capable of either the continuous monitoring of the guard frequency, or a priority scan function with guard as priority.

B. Audio Control Systems. One audio control system shall be installed for the pilot who provides control, selection and operation of the radio transceivers through a single set of helmet earphone/ microphone jacks. As a minimum, the audio control system shall provide for selecting the following radio systems:

VHF-AM aeronautical radio (VHF-1)

VHF-FM auxiliary radio (VHF AUX-FM)

The pilot shall be able to select a desired transmitter and communicate using a microphone push to talk switch. When a transmitter is selected, the corresponding receiver audio shall automatically be selected. Separate selector switches shall be provided for the pilot to permit selecting receiver audio from any one or a combination of all receivers.

IV. Tank and Gate Requirements and Standards.

A. Tank capacities and drop gate configurations vary with make and model and between individual contractor's equipment. the volumes range from 400 to 800 gallons. Some operate differently than others, but their basic functions and capabilities are similar. The following requirements are common to all SEATs, regardless of make, model, or release mechanism:

Tank/Hopper

1. Tank/Gate systems should not leak when loaded at the Interagency carded permissible loads (gallons in the hopper).

2. Tank (hopper) quantity indicators shall be visible to the loading

crew and pilot.

Gate/ Drop Door

1. Gate must be re-closable in flight (as opposed to manually resetting the door on the ground after a single-shot salvo drop).

2. Gates must be capable of salvo drops as well as split drops. (For instance, one full hopper may be expended in a single drop, or split between two or more drops in substantially equal quantities). Constant flow and/or variable opening doors, split doors, and trail doors are acceptable.

*In the past, when SEATs were acquired through the rental process, standard Transland type dry product gates were acceptable for use in lighter fuel conditions. Now that SEATs are contracted for and may be dispatched to any fuel/terrain type, unmodified agricultural gates are no longer acceptable.

3. The gate/door must have emergency dump capability. Some mechanical drop doors, such as modified Transland gates, and the Melex Salvo gate are themselves the emergency dump, however, if the gate door operation is other than mechanical, such as systems powered by pneumatic or hydraulic pressure or any other means, the emergency dump system must be isolated and independently operated.

Hopper/Tank Venting

1. The tank must be properly vented to insure against negative pressures developing within the tank, resulting in cavitation and non-uniform flows. Vents may be top mounted, spring loaded doors, which are vacuum operated, venturi or positive pressure scoop type vents, or mechanically operated vents which deploy in relation to the gate opening. There should be no routine leakage of water or retardant or slop over from the vent areas. Internal anti-slosh baffle plates are acceptable.

V. SEAT Aircraft Markings. Historically, SEATs are called on to operate at low level and in an environment that is filled with smoke; therefore it is imperative that the aircraft itself be highly visible and easily identified. Both the Exclusive Use and the National Call-When-Needed (CWN) contract specify the aircraft paint schemes, identification stripes and tanker number specifications.

CHAPTER 6 - SEAT LANDING AREAS

I. Introduction. To realize the full economic and operational effectiveness of SEATs and to optimize their self-sufficient capabilities, SEAT flight operations should be established as close to the incident as possible using available airstrips. Therefore it is crucial that the user be familiar with the operational limitations of these types of aircraft.

II. Planning. The responsibility for planning the most efficient use of SEATs falls directly on the aviation management of the user agency. SEATs are very versatile, and can be used from a wide variety of aviation facilities.

III. Operation from established Air tanker Bases. SEATs may operate from the same facility as large airtankers, provided the base has personnel that have been trained in SEAT loading and refueling operational procedures. These specific operational procedures must be incorporated into the base operations supplement. The two basic safety precautions that need to be taken are:

A. If operating from an established airtanker base, coordination with the base manager regarding separate loading and fueling areas to ensure that SEAT loading is done well away from large air tanker retardant loading operations. An approved loading plan must be established prior to any loading taking place, to ensure that safety and separation from large aircraft is maintained.

B. If the SEAT is to be loaded from the established pits, coordination between the loading personnel and the SEAT pilot, along with communication procedures, must be established prior to any loading taking place, to ensure that safety and separation from large aircraft is maintained.

IV. Operations from Airports and Air Strips. The best utilization of SEATs requires that they be placed close to the incident. This may best be accomplished by placing the SEAT operation at the nearest airport or airstrip. Coordination with the local airport manager or owner of the airstrip is crucial to the safe and efficient operation of this resource. It is the responsibility of the local aviation manager along with the SEAT manager to establish a working relationship with the airport manager. Sometimes the procurement section of the user agency will be required to set up rental agreements and payment schedules. The SEAT manager will be responsible for the set up and day to day safe and efficient operation of the SEAT base. Local airports are best for these operations because of the ease of maintaining logistical support, and the close proximity of aviation fuel, as well as the known runway capability.

V. Operations from Off Airport (remote) Areas. If it is determined that an off airport operation is desirable, operations from locations other than airports shall be at the sole discretion of the SEAT contractor/ operator. The proper and efficient use of remote landing areas will take some pre-planning on the part of the user agency aviation manager along with both the contractor and the SEAT manager. Always keep in mind that even though a remote landing area is closer to the incident than the established airport or airstrip, it may present logistical support problems that preclude its efficient use.

CHAPTER 7 - PERSONAL PROTECTIVE EQUIPMENT REQUIREMENTS

I. Introduction. Personal protective equipment (PPE) consists of clothing and equipment that provides the wearer protection in hazardous environments such as flash fires. Certain standards have been developed for use by our contractors and contractors as well as our own personnel. For the SEAT operation the following standards have been agreed upon.

II. Personal protective Equipment. The pilot shall possess and use the following items of protective equipment, which will be available for inspection for suitability and condition at the time of carding.

A. An aviator's protective helmet for the pilot equipped with a boom-microphone and earphones comparable with the radio specifications listed in the contract, or Call-When-Needed agreement. The helmet shall be equipped with a chin strap and shall be individually fitted to cover the head and provide protection for ears, temples, and back of the head. The helmet shall be worn by the pilot during all flights. The flight helmet must provide full cranial impact protection, and retention devices that retain the helmet in place on the wearer's head during rapid acceleration, deceleration and impact.

B. Pilots shall wear long-sleeved shirt and trousers or a long sleeved flight suit made of fire-resistant polyamide or aramid material or equal. Pilots shall wear leather boots and leather or polyamide or aramid gloves. The shirt, trousers, boots and gloves shall overlap to prevent exposure to flash burns. A proper size flight suit will cover the maximum amount of skin area. This includes sleeves long enough to reach the first knuckle of the thumb before securing snugly over the flight gloves at the wrist. The legs should reach the floor while standing and before securing over the leather boot at the ankle. The legs should not ride up over the boot while seated. The slide fastener front closure shall provide coverage high on the neck. The flight glove shall have a long cuff extending several inches above the wrist to provide total coverage of the wrist area when the flight suit is worn. The foot gear must be made of all leather uppers that come above the ankles and shall be constructed so that metal parts, shoestring eyes or zippers, are protected by leather from contact with the wearer's ankles.

C. Personal protective equipment required for the support personnel is outlined in both the Exclusive Use and National Call-When-Needed contracts.

CHAPTER 8 - SEAT LOADING AND REFUELING

I. Introduction. Unless otherwise specified by contractual agreement, all loading and refueling operations are the sole responsibility of the contractor and must not be performed by *loading personnel*. However, there may be times when the SEAT is to be loaded with fire retardants or suppressants at an established airtanker base, at such times the contractor will supervise the assigned government personnel during the entire loading operation. The government personnel shall have been trained prior to the arrival of the SEAT at the air tanker base. See chapter 6 SEAT landing areas, part III. Operations for established Airtanker bases, for a complete review of the procedures and training required. All SEATs are approved for "HOT" reloading.

The contractor is required by contract to test each load of retardant with a refractometer reading to ensure compliance of manufactures specification prior to induction into the aircraft. The contractor will supply the SEAT Manager with the results of the refractometer readings for their records. SEAT Managers will conduct periodical quality assurance checks with the contractor. When operating from a Large Airtanker Base, the Air Tanker Base Manager is responsible for ensuring that the loading personnel meet this requirement and provides documentation to the SEAT Manager. The SEAT Manager will be responsible for ensuring this documentation is given to the contractor.

II. Refueling SEAT Aircraft. Refueling operations are the sole responsibility of the contractor and will not be performed by government personnel. Some SEATs are approved for "hot" refueling; provided the appropriate dry-break equipment is installed and approved fueling procedures are followed. All fueling operations are to be conducted in a secure area, and without presenting any undue hazard to other aircraft or personnel.

The SEAT Manager will require the contractor to demonstrate their ability to fuel the aircraft in accordance with the specifications listed the contract.

SINGLE ENGINE AIR TANKER HOT LOAD/ FUEL PROCEDURES

A. Purpose. Reduce loading times, establish safe and efficient refueling procedures and to prevent adverse impacts on the aircraft systems. These procedures may be applied to other non turboprop aircraft.

B. Objectives. The objective of this section is to provide safe and efficient procedures for loading SEATs with fire retardant or suppressant without shutting down the aircraft engine.

C. Definition. Hot loading is loading an aircraft with fire retardant or suppressant while the engine is running. Hot refueling is fueling the aircraft while the engine is running. An aircraft shall not be refueled while the engine is running or propellers turning unless the aircraft is equipped with an appropriate dry-break refueling system.

D. Responsibility. Unless otherwise specified by contract, the fueling operations are the sole responsibility of the contractor and will not be performed by government personnel. Each SEAT manager, or air tanker base manager, is responsible for overseeing compliance with established procedures, ensuring safe and efficient fueling and loading operations.

E. Site Specific Loading/Fueling Procedures. Some airtanker bases and other localities have policies prohibiting one or more of these procedures. In those cases, the local agency policy will be complied with.

THERE SHALL BE NO SIMULTANEOUS "HOT" LOADING AND REFUELING

III. Procedures

A. Initial Arrival Procedures. On initial contact with airtanker base personnel, the SEAT pilot shall shut down the aircraft and review the following procedures with the base manager:

Ramp traffic flow procedures
Hot loading/ refueling procedures
Base communication procedures
Emergency procedures
Basic safety procedures

B. Ramp procedures. Prior to entering the loading area the pilot will contact the ramp manager (SEAT manager, loading area manager...) on VHF-FM to ensure that the loading area is clear before the aircraft is directed to approach the assigned loading pit.

Once in the loading pit the pilot will stop the aircraft and put the engine at idle and lock the brakes. For turbine aircraft the pilot will put the propeller into flat pitch (ground idle).

When the pilot has secured the aircraft, he will inform the ramp manager by radio or using the airtanker operations hand signal.

The ramp manager will position himself at all times to allow a clear view of the pilot, aircraft propeller, loaders and fuelers. The ramp manager shall remain in communication with the pilot at all times through radio contact or hand signals.

The ramp manager will visually check the area before signaling the loaders or fuelers that it is safe to approach the aircraft.

The retardant loaders and fuelers will remain clear of the loading area until signaled by the ramp manager that it is safe to approach the aircraft.

If unauthorized personnel or equipment are observed approaching the aircraft, the ramp manager shall signal the pilot to shut down the aircraft engine immediately.

C. Retardant/ suppressant loading procedures.

ALL HOT LOADING OPERATIONS MUST COMPLY WITH THE FOLLOWING:

The ramp manager and the pilot shall remain in contact with each other by radio or hand signals throughout the loading and refueling operations.

Loaders will approach and depart the aircraft only in the safety area behind the trailing edge of the front wing. All loading and refueling operations must be conducted in this safety area.

The ramp manager shall keep the loading area secure from any unauthorized personnel.

The pilot will signal the loader to shut off the pump when the aircraft has been loaded to the desired level. The loader will then disconnect the hose and pull it back away from the loading area.

The pilot shall remain at the controls of the aircraft during all hot fueling and hot loading operations.

Bonding and grounding procedures shall be followed by all fueling personnel.

Aviation Fuel Nozzle Requirements:

A non-locking discharge lever
A bonding cable with plug
A brass or aluminum nozzle
A 100 micron screen in nozzle
A serviceable dust cap for nozzle spout

When the loading and fueling operations are complete, the ramp manager shall notify the pilot by radio or hand signals that the loading and refueling crew and their equipment are clear of the aircraft. The pilot will then be cleared and directed from the pit area by the ramp manager.

D. Emergency Procedures

Incase of any type of emergency situation, the Ramp Manager will notify the pilot by radio or hand signals of the type of emergency.

1. Fire. In the event of a fire, the ramp manager will immediately notify the pilot, loaders and fuelers by radio or using hand signals. Fire extinguisher will be manned for pilot protection and appropriate base procedures will be followed.

2. Communication Loss. If radio communications are lost, the ramp manager will establish eye contact with the pilot and pat the ear phones followed by a thumbs down signal. Loading and/or fueling operations may continue, using hand signals, until the radio problem has been identified and corrected.

3. Engine Shutdown. In the event that any situation requiring engine shut down occurs, the ramp manager will notify the pilot by radio or hand signal drawing the index finger across the throat. The pilot will immediately shut down the engine.

E. General Precautions.

1. Always maintain communication with the pilot by radio or hand signals.

2. Only authorized personnel shall perform aircraft fueling and loading operations.

3. Only essential personnel shall be allowed in the loading and fueling area during these procedures

4. Only the ramp manager, loaders or fuelers may approach the aircraft while the engine is running. SEAT Manager must obtain permission from the pilot prior to approaching the aircraft while it is running.

5. All operations shall remain within the safety area.

6. Review and update all base fire emergency procedures.

CHAPTER 9 - SEAT MANAGEMENT AND INCIDENT COMMAND COORDINATION

I. Introduction. For incidents to which a Type I or II Incident Management Team has been assigned, there needs to be close coordination between the Air Operations branch on the team and the SEAT manager.

A. Coordination with Incident Command. The coordination between the incident and the SEAT is the responsibility of the SEAT manager. The SEAT manager will check in with the incident the same as all other air resources, and provide the incident management team with a briefing of the capabilities and limitations of the SEAT. The SEAT manager will set up a meeting with the Air Operations Branch Director.

B. Coordination with Air Operations Branch. The coordination between the SEAT manager, the Air Operations Branch Director (AOBD) and the ATGS is the major link in the efficient and effective use of the SEAT on large complex fire assignments. It is from these individuals (AOBD & ATGS) that the mission specific assignments are issued. There needs to be an unbroken line of communication between the SEAT base and the incident management team on the fire. The SEAT manager is also responsible for the daily cost accounting of the SEAT operation, and the submission of the appropriate completed forms.

GLOSSARY

- A -

Abort: To terminate a preplanned aircraft maneuver.

Adapter: A hose-coupling device for connecting hose threads of the same size.

Agency dispatcher: Dispatch organization for the agency with primary jurisdictional responsibility.

AGL: Above ground level.

AIR TAC: ICS identifier the Air Tactical Group Supervisor (ATGS).

Air tanker: Any of four ICS size classes of fixed-wing aircraft capable of transport and delivery of fire suppressant or retardant materials.

Allocated resources: Resources which are dispatched to an incident but have not yet checked in.

Aviation Management : Aviation Management (formerly OAS)

Ambient air: The air of the surrounding environment.

Anchor point: An advantageous location, usually a barrier to fire spread, from which to start constructing fireline. This is used to minimize the chance of being flanked by the fire while the line is being constructed.

Application rate: The total volume of liquid or mass of material applied per unit area based on the output rate of the applicator and the area covered per unit time.

Area ignition: The ignition of individual fires either simultaneously or in quick succession, spaced to influence and support each other to produce a fast, hot fire spread.

Aspect: The direction a slope faces the sun, expressed in cardinal direction. Same as exposure.

Assigned resources: Resources checked in and assigned work tasks on an incident.

- B -

Back-burn: Used in some localities to specify fire set to spread against the wind in prescribed burning. Also called a **backing fire**.

Backfire: (1) Fire set along the inner edge of a fire control line to stop a spreading wildfire by reducing the fuel or changing the direction of force of the fire's convection column. The term applies best where skilled techniques are required for successful execution. Using such fire to consume unburned fuel inside the fireline to speed up line holding and mop-up is usually called burning out or clean burning. (2) A prescribed fire set to burn against the wind.

Barrier: Any obstruction to the spread of fire. Typically, an area or strip devoid of flammable fuel.

Base (flight pattern): A flight path at right angles to the landing runway or target off its approach end.

Black line: Fuel between the fireline and the fire that has been burned out. Line is not complete until fuel is burned out between fireline and fire or no unburned fuels (vegetation) between the fireline and the fires edge.

Blowup: Sudden increase in fire intensity or rate of spread sufficient to preclude direct control or to upset existing control plans. Often accompanied by violent convection and may have other characteristics of a firestorm.

Branch: The organizational level directing two or more divisions; organizationally between the Operations Section Chief and the Division/Group Supervisors.

Break left/right: Turn left/right. Applies to aircraft in flight, usually on the drop run and when given as a command to the pilot; implies immediate compliance, e.g., "Tanker 75, break right; a small plane is crossing the target."

Burning conditions: The state of the combined factors of environment that affect fire in a given fuel association.

Burning index: A number related to the contribution that fire behavior makes to the amount of effort needed to contain a fire in a particular fuel type within a rating area. This is an index for describing fire danger.

Burning out: Setting fire inside a control line to consume fuel between the edge

of the fire and the control line (see **backfire**).

Burning period: That part of each 24-hour period when fires will spread most rapidly, normally between 10 a.m. and 6 p.m.

- C -

Canopy: The stratum containing the crowns of the tallest vegetation present (living and dead), usually above 20 feet.

CAR Part 3: Predecessor of FAR Part 23; refers to normal certificated load limits, etc.

CAR Part 8: Predecessor of portions of FAR parts 23 and 91.39; refers to restricted category of civil aircraft operating limits, e.g., may not fly over congested areas, may carry only essential personnel, etc.

Cardinal points: The four chief points of the compass -- north, south, east and west.

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 tail at 6 o'clock, e.g., "The target is at your 9 o'clock position."

Concentration: The amount of the substance contained per unit volume of a liquid.

Configuration: How an aircraft is equipped.

Congested area: An FAA term for an area where aviation operations conducted at low-level altitudes may result in damage to property or injury to ground personnel, e.g., buildings or dwellings, recreational sites, transportation corridors, industrial properties, assemblies of persons, communications facilities, transmission lines, water resources, etc.

Coverage level: A figure representing the number of gallons of retardant mixture dropped, or prescribed, to cover fuels in a 100-square-foot area.

Crosswind (flight pattern): A flight path at right angles to the landing runway or target off its upwind or departure end.

- D -

Delayed attack fire: A fire which due to its lower priority and/or unavailability of resources will not be staffed for several hours or possibly several days.

Direct attack: Any treatment applied directly to a burning fuel such as wetting, cooling, smothering or chemically quenching the fire or by physically separating the fire from the unburned fuel.

Discovery: Determination that a fire exists; in contrast to detection, location of a fire is not required.

Dispatch center: A facility from which resources are directly assigned to an incident.

Dispatcher: A person, who receives reports of discovery and status of fires, confirms their location, takes action promptly to provide the people and equipment likely to be needed for control in the first attack and sends them to the proper place.

Divert: Change in aircraft assignment from one target to another or to a new incident.

Division: A unit established to divide an incident into geographical areas of operations.

Downwind (flight pattern): A flight path parallel to the landing runway or target in a direction opposite to the landing or drop area.

Dozer line: Fireline constructed by a bulldozer.

Drop: That which is dropped on a cargo dropping, or retardant, water/foam dropping operations.

Drop configuration: The type airtanker/helitanker drop selected to cover the target, based on door/tank system and how the doors and compartments are sequenced to open/close (see **salvo, split load** and **trail**).

Drop zone: The area around and immediately above the target to be dropped on.

Drought index: A number representing net effect of evaporation, transpiration and precipitation in producing cumulative moisture depletion in deep duff or upper soil layers. The Palmer Drought Index is the most widely used.

Dry lightning storm: A lightning storm with negligible precipitation reaching

the ground.

Dry run: A flight made on the flight route at or near the "live drop" altitude above ground but without making a drop.

Duff: The partly decomposed organic material of the forest floor beneath the litter of freshly fallen twigs, needles and leaves.

- E -

Early: A drop that was early or short of the target, e.g., "You were early on the last drop."

Edge firing: A technique of broadcast burning in which fires are set along the edges of an area and allowed to spread to the center.

Engine: Any ground vehicle providing specified levels of pumping, water and hose capacity.

Escape route: A route of travel known to all that leads away from the point of danger, generally to a safety zone. It should be preplanned.

Escaped fire: A fire which has exceeded initial attack capabilities.

Exit: Flight route away from an operations area or a command used to indicate the direction the Air Tanker Coordinator wants the pilot to fly after a given maneuver, e.g., "Exit southbound over the lake."

Exposure: Property that may be endangered by a fire in another structure or by a wildfire.

Extend: To drop retardant in such a way that the load slightly overlaps and lengthens a previous drop, e.g., "Extend the last drop."

Extra-period fire: A fire not controlled by 10 a.m. of the day following discovery.

- F -

False alarm: A reported smoke or fire requiring no suppression; e.g., brush burning under control, mill smoke, false smoke, etc.

FAR Part 23: See **CAR parts 3 and 8**.

Final (flight pattern): A flight path in the direction of a landing or drop (short for **final approach**).

Fire behavior: The manner in which a fire reacts to the variables of fuel, weather and topography.

Fire cooperator: A fire-trained local person or agency who has agreed in advance to perform specified fire control services.

Fire danger: Resultant of both constant and variable fire danger factors which affect ignition spread, difficulty of control of fires and the damage they cause.

Fire danger rating: A fire management system that integrates the effects of selected fire danger factors into one or more qualitative or numerical indices of current protection needs.

Fire effects: The physical, biological and ecological impact of fire on the environment.

Fine fuel moisture: The probable moisture content of fast-drying fuels which have a time lag constant of one hour or less, i.e., grass, leaves and small twigs.

Fireline: The part of a control line that is scraped or dug to mineral soil; sometimes called **fire trail**.

Fire management: All activities required for the protection of burnable forest values from fire, and the use of fire to meet land management goals and objectives.

Fire perimeter: The fire boundary at a given moment.

Fire progress map: A map maintained to show at given times the location of the fire, deployment of suppression forces and progress of suppression.

Fire retardant: Any substance except plain water that by chemical or physical action reduces flammability of fuels or slows their rate of combustion.

Fire review: Process of analyzing the fire management action on a given unit or the specific action taken on a given fire to identify reasons for both good and poor results and recommend ways of doing a more effective job.

Fire scar: (1) A healing or healed injury or wound caused or accentuated by

fire on a woody plant. (2) The scar made on a landscape by fire.

Fire season: The period(s) of the year during which fires are likely to occur, spread and do sufficient damage to warrant organized fire control.

Fire shelter: An aluminized, heat reflective, firefighters personal protective pup tent used in fire entrapment situations.

Firestorm: Violent convection caused by a large continuous area of intense fire. Often characterized by destructively violent surface in-drafts beyond the perimeter and sometimes by tornado-like whirlwinds.

Fire suppression organization: (1) The management structure designed to enable carrying out line and staff duties of the incident commander with increases in size and complexity of the suppression. (2) All supervisory and facilitating personnel assigned to fire suppression duty under the direction of an incident commander.

Fire tool cache: A supply of tools and equipment assembled in planned quantities or standard units at a strategic point for fire suppression use.

Fire trap: (1) An accumulation of highly flammable fuels. (2) A situation in which firefighting is highly dangerous.

Fire weather forecast: A weather prediction specially prepared for wildland fire control.

Fire weather station: A meteorological station specially equipped to measure weather elements that have an important effect on fire control.

Firing out: The act of setting fire to fuels between the control line and the main fire in burning out operations; also called **burning out**.

Fixed tank: A tank mounted inside or directly under an aircraft which contains water or retardant for dropping on a fire.

Flammability: The relative ease with which fuels ignite and burn, regardless of fuel quantity.

Flank fire: A fire set along a control line parallel to the wind and allowed to spread at right angles.

Flare up: Any sudden acceleration of fire spread or intensification of the fire.

Unlike blowup, a flare up is of relatively short duration and does not radically change existing control plans.

Flash fuels: Fuels such as grass, leaves, dropped pine needles, fern, tree moss and some kinds of slash which ignite readily and are consumed rapidly when dry; also called fine fuels.

Flash over: Rapid combustion and/or explosion of unburned gasses trapped at some distance from the main fire front; usually occurs in poorly ventilated topography.

Flow rate: The rate of dispensing liquid, measured in gallons or liters per minute, or similar terms.

FM (Fox-Mike): See **VHF-FM**.

Foam: A fire-extinguishing chemical that forms bubbles when mixed with water, it adheres to the fuel and reduces combustion by cooling, moistening and excluding oxygen.

Formulation: Mixture produced and packaged by the manufacturer. Once the formulation is diluted in the field, it is referred to as a tank mix.

Free-burning: The condition of a fire or part of a fire unchecked by natural barriers or control measures.

Friction loss: Resistance to flow of liquids (usually water) through hose and appliance.

FTA: *Fire Traffic Area developed by aerial firefighting personnel to provide a standardized airspace structure to enhance air traffic separation over wildland fire (or other) incidents.*

Fuel break system: A series of modified strips or blocks tied together to form strategically located fuel breaks around land units.

Fuel moisture content: The quantity of moisture in fuel; expressed as a percentage of the weight when thoroughly dried at 212 degrees F.

Fuel-moisture-indicator stick: A specially prepared stick or set of sticks of known dry weight continuously exposed to the weather and periodically weighed to determine changes in moisture content as an indication of moisture changes in forest fuels.

Fuel tender: Any vehicle capable of supplying fuel to ground or airborne equipment.

Fuel type: An identifiable association of fuel elements of distinctive species, form, size, arrangement or other characteristics that will cause a predictable rate of fire spread or difficulty of control under specified weather conditions.

Fuel type classifications: The division of wildland areas into fire hazard classes.

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 of exposure to ultraviolet sun rays.

- G -

General staff: The group of incident management personnel composed of an Operations Section Chief, a Planning Section Chief, a Logistics Section Chief and a Finance Chief.
GPS: Global Positioning System.

Ground fire: Fire that consumes the organic material beneath the surface ground litter, e.g., a peat fire.

Gutter trench: A ditch dug on a slope below a fire, designed to catch rolling burning material.

- H -

Hand crew: Individuals organized, trained and supervised principally for operational assignments on an incident.

Hand line: Line constructed using hand tools.

Hazard: A fuel complex defined by kind, arrangement, volume, condition and location that forms a special threat of ignition or of suppression difficulty.

Hazard reduction: Any treatment of a hazard that reduces the threat of ignition and spread of fire.

Head: Pressure due to elevation of water, it equals 0.433 pounds per square inch (PSI) of elevation; also called back pressure.

Head fire: A fire spreading or set to spread with the wind.

Head of the fire: A "running edge" of the fire, usually spreading with the greatest speed, driven by the wind or topography. It is not uncommon to have two or more heads on a fire.

Heavy fuels: Fuels of large diameter, e.g., snags, logs and large limbs, which ignite and are consumed more slowly than flash fuels; also called **coarse fuels**.

Heel (of a fire): The part of the fire perimeter opposite the head (see origin). Also referred to as **rear**.

HEL CO (HLCO): Call sign identifier of the Helicopter Coordinator.

Held line: All worked control line that still contains the fire when mop-up is completed; excludes lost line, natural barriers not backfired and unused secondary lines.

Helibase: The main location within the general incident area for parking, fueling, maintenance and loading of helicopters; usually at or near the incident base.

Helibase crew: A crew of individuals who may be assigned to support helicopter operations.

Helicopter tender: A ground service vehicle capable of supplying fuel and support equipment to helicopters.

Helispot: A temporary landing spot for helicopters.

Helitack foreman: A supervisory firefighter trained in the tactical and logistical use of helicopters for fire suppression.

Helitanker: A helicopter equipped with a fixed tank or a suspended bucket-type container used for aerial delivery of water or retardants.

Hold (holding area): A predetermined maneuver (race track pattern) which keeps aircraft within a specified airspace while awaiting further directions from the air traffic controller.
Holding action: Use of an aerial application to reduce fire intensity and fire spread until ground resources arrive; common with delayed attack fires.

Holdover fire: A fire that remains dormant for a considerable time; also

hangover or **sleeper**.

Hopper capacity: Usable full capacity of the hopper in U.S. gallons.

Hose lay: Arrangement of connected lengths of fire hose and accessories on the ground beginning at the first pumping unit and ending at the point of water delivery.

Hot line: Line with active fire along it.

Hotshot crew: A highly trained firefighting crew used primarily in hand line construction.

Hot spotting: Checking the spread of fire at points of rapid spread or special threat; usually the initial step in prompt control with emphasis on first priorities.

- I -

Incendiary fire: A fire willfully set by anyone to burn vegetation or property not owned or controlled by that person and without consent of the owner.

Incident: An occurrence or event, either human-caused or a natural phenomenon, that requires action by emergency service personnel to prevent or minimize loss of life or damage to property and/or natural resources.

Incident action plan: Objectives reflecting the overall incident strategy and specific control actions for the next operational period.

Incident base: Where the primary logistics functions are coordinated and administered; there is only one base per incident.

Incident command post (ICP): Where the primary command functions are executed; usually collocated with the incident base.

Incident command system (ICS): The combination of facilities, equipment, personnel, procedures and communications operating with a common organizational structure, with responsibility for the management of assigned resources to effectively accomplish stated objectives pertaining to an incident.

Independent action: Suppression action by other than the regular fire control organization or cooperators.

Indirect attack: Control line along natural- or human-made firebreaks,

favorable breaks in topography or at a considerable distance from the fire perimeter.

Indirect line: A method of suppression in which the control line is a considerable distance from the fire and intervening fuel is burned out.

Infrared (IR): A heat detection system used for fire detection, mapping and hot spot identification.

Initial attack (initial action): Control efforts taken by the first resources to arrive at the incident.

INS: Inertial Navigational System.

Intervolometer: A cockpit-mounted electronic device/selector box which actuates compartment doors singly, or multiple doors simultaneously or in sequence, at pre-set time intervals. The pilot or copilot selects the number of doors and time interval between doors to produce the desired coverage level and line length.

- J -

Jurisdictional agency: The agency having jurisdiction and responsibility for a specific geographical area.

- L -

Late: Indicating that a drop was late or overshot the target, e.g., "You were late on the last drop."

Lead plane: Aircraft which flies trial runs over the fire and directs the tactical deployment of air tankers.

Leapfrog method: A system of organizing workers in fire suppression in which each crewmember is assigned a specific task, e.g., clearing or digging fireline on a specific section of the control line, and when that task is completed, passes other workers in moving to a new assignment

Light burning: Periodic broadcast burning to prevent fuel accumulation in quantities that would cause excessive damage or difficult suppression in case of accidental fires.

Lightning fire: A fire caused directly or indirectly by lightning.

Litter: The top layer of the forest floor, composed of loose debris of dead sticks, branches, twigs and recently fallen leaves or needles; it is little altered in structure by decomposition.

Live burning: Progressive burning of green slash as it is cut.

Live run: A flight over the drop area in which a discharge of cargo or retardant/water, etc., will be made.

Lookout: (1) A person designated to detect and report fires from a vantage point. 2) A location from which fires can be detected and reported. (3) A fire crewmember assigned to observe the fire and warn the crew when there is danger of becoming trapped.

Low pass: Low-altitude run over the target area; may be used by the Air Tanker Coordinator to get a closer look at the target or to show an air tanker pilot a target that is difficult to describe or by a tanker pilot to get a better look at the target or to warn ground personnel of an impending drop.

- M -

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.

May day: International distress signal/call; when repeated three times, it indicates imminent and grave danger and that immediate assistance is required.

Maximum ferry range: Greatest distance that an airplane can travel in air speed miles under unloaded optimal working speed and working radius flight conditions.

Message center: Part of the Incident Communications Center and collocated or placed adjacent to it, it receives, records and routes information about resources pertaining to the incident, resource status and administration and tactical traffic.
MOA: A military operations area (special use area) found on aeronautical sectional charts.

Mobilization center: An off-incident location at which emergency service personnel and equipment are temporarily located pending assignment, release, or reassignment.

Modular airborne firefighting system (MAFFS): A pressurized self-contained retardant system for use in Lockheed C-130 military aircraft.

Mop-up, dry: A method in which burning materials are extinguished without water.

Mop-up, wet: A method in which burning materials are extinguished with water, or in combination with water and soil.

MSL: Mean sea level.

MTR: A military training route found on aeronautical sectional maps and AP/18 maps; routes accommodate low-altitude training operations -- below 10,000 feet MSL -- in excess of 250 KIAS.

Multi-agency coordination (MAC): A generalized term which describes the functions and activities of representatives of involved agencies in a geographic area who come together to make key decisions regarding the prioritizing of incidents and to share the use of critical resources. A MAC organization is not part of the ICS and is not involved in incident strategy or tactics.

- N -

National interagency management system (NIMS): Five major subsystems which collectively provide a total system approach to all-risk incident management -- the Incident Command System; Training; Qualifications and Certification; Supporting Technologies and Publications Management.

National Wildfire Coordinating Group (NWCG): A group of people formed under the direction of the Secretaries of the Interior and Agriculture and composed of representatives of the U.S. Forest Service, BLM, National Park Service, U.S. Fish and Wildlife Service and the Association of State Foresters. The group's purpose is to improve the coordination and effectiveness of wildland fire activities and provide a forum to discuss, recommend appropriate action and resolve issues and problems of substantive nature. It is the certifying body for all courses in the National Fire Curriculum.
Normal fire season: (1) A season when weather, fire danger and number and distribution of fires are about average. (2) A period of the year that normally comprises the fire season.

Normal operating speed: Air speed under fully loaded configuration normally used by pilots in the field; may be a range or average speed.

NTSB: National Transportation Safety Board.

- O -

On target: Acknowledgment to the pilot that the drop was well placed.

One foot in the black: Constructing fireline next to the fire; usually the safest method of attacking a fire of low or moderate intensity in light fuels.

Open line: Refers to open fire front where no line has been constructed.

Operational period: The time frame scheduled for execution of a given set of operation actions as specified in the Incident Action Plan.

Orbit: See **hold**.

Orthophoto maps: Aerial photographs corrected to scale such that geographic measurements may be taken directly from the prints; they may contain graphically emphasized geographic features and may be provided with overlays of such features as water systems, facility location, etc.

Out-of-service resources: Resources assigned to an incident but unable to respond for mechanical, rest or personnel reasons.

- P -

Patrol: (1) To travel a given route to prevent, detect and suppress fires. (2) To go back and forth watchfully over a length of fireline during or after its construction to prevent slop overs and to control spot fires. (3) A person or group carrying out patrol actions.

Perimeter: The total length of the outside edge of the burning or burned area.

Planning meeting: A meeting, held as needed throughout the duration of an incident, to select strategies and tactics for incident control operations and for service and support planning.

Pockets: Deep indentations of unburned fuel along the fire perimeter; normally, fireline will be constructed across pockets and they are then burned out.

Prescribed burning: Controlled application of fire to wildland fuels in either their natural or modified state. Done under specified environmental conditions which allow the fire to be confined to a predetermined area and at the same time

to produce the intensity of heat and rate of spread required to attain planned resource management objectives.

Pre-suppression: Activities in advance of fire occurrence to ensure effective suppression action; includes recruiting and training, planning the organization, maintaining fire equipment and fire control improvements and procuring equipment and supplies.

Pre-treat: Laying retardant line in advance of the fire where groundcover or terrain is best for fire control actions, or to reinforce a control line; often used in indirect attack.

Progressive hose lay: Hose laid as it is used to suppress the fire. Lateral hose lines are connected to the main hose line at regular intervals to assist in the fire suppression effort and mop-up.

Protection boundary: The exterior boundary of an area within which a given agency has assumed a degree of responsibility for emergency operations. It may include lands protected under agreement or contract.

PSI, PSIG: Pounds per square inch of mercury; a measure of pressure.

- R -

Radio cache: May consist of a number of portable radios, a base station and in some cases a mobile repeater, all stored in a predetermined location for dispatch to an incident.

Rate of spread: The relative activity of a fire in extending its size, expressed as rate of increase of the total perimeter of the fire, as rate of forward spread of the fire front or as rate of increase in area, depending on the intended use of the information.

Rear of the fire: Usually opposite from the head, closest to the origin and nearest the source of the wind. The rear edge of the fire is usually burning slower than other sectors of the fire. Sometimes called the **heel** or **base** of the fire.

Reburn: (1) Subsequent burning of an area in which fire has previously burned but has left flammable fuel that ignites when burning conditions are more favorable. (2) An area that has reburned.

Reciprocating: Internal combustion, as opposed to turbine, engine.

Red Flag Warning: *Used to warn of impending, or actually occurring critical weather conditions that could result in extensive wildland fire activity. Its issuance denotes a high degree of confidence that weather and fuel conditions consistent with local Red Flag Event criteria will occur in 24 hours or less.*

Relative humidity: The ratio of the amount of moisture in a given volume of space to the amount that volume would contain if it were saturated. The ratio of the actual vapor pressure to the saturated vapor pressure.

Resistance to control: The relative difficulty of constructing and holding a fireline as affected by resistance to line construction and by fire behavior; also called difficulty of control.

Resources: All personnel and major items of equipment available, or potentially available, for assignment to emergencies; described by kind and type.

Retardant (long-term): Contains a chemical which alters the combustion process and causes cooling, smothering/insulating of fuels; remains effective until diluted or rinsed off by precipitation.

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.

Retardant line: Usually constructed by an air tanker or helicopter; treated like wet line and followed up with ground action.

Risk: (1) The chance of fire starting as determined by the presence and activity of causative agents. (2) A causative agent. (3) A number related to the potential number of firebrands to which a given area will be exposed during the rating day.

Rotor span: The length of a rotor diameter, it is used to make adjustments in the alignment of flight routes when dropping water/retardant, e.g., "Move the next drop two rotor spans to the left."

Route (flight): The path an aircraft takes from a departure pattern or point to an arrival point or pattern at destination.

- S -

Saddle: Depression or pass in a ridge line.

Safety zone: A preplanned area void of burnable fuels used for escape if the

fireline is overrun or outflanked, or if a spot fire causes fuels outside the control line to render the fireline unsafe. During an emergency, tankers may be asked to reinforce a safety zone using retardant drops.

Salvo: Dropping the entire load or compartment(s) at one time.

SEAT (single engine air tanker): Commonly, but not always, an agricultural aircraft modified for aerial fire retardant and suppressant delivery.

Segment: A geographical area in which a task force strike team leader or single resource boss is assigned authority and responsibility for coordinating resources and implementing planning tactics. May be a portion of a division; an area inside or outside the perimeter of an incident or a fire or group of fires within a complex. Identified with Arabic numbers.

Simple hose lay: A hose lay consisting of consecutive coupled lengths of hose without laterals, extended from the water source or pump to the nozzle. It is filled with water only after it is put in place.

Slash: Debris left after logging, pruning, thinning or brush cutting; includes logs, chunks, bark, branches, stumps and broken under story trees and brush.

Slopover: A fire edge that crosses a control line or natural barrier intended to confine the fire, and the resultant fire.

Smokejumper: A firefighter who travels to fires by aircraft and parachutes to the fire.

Smoldering: Behavior of a fire burning without flame and slowly spreading.

Snag: A standing dead tree or part of a dead tree from which at least the leaves and smaller branches have fallen; often called **stub**, if less than 20 feet tall.
Span of control: The supervisory ratio of from three to seven individuals with five being established as an optimum.
Split load: The dropping of a partial load (two doors at a time).

Spur ridge: A small ridge which extends finger-like from a main ridge.

Staging area: A temporary on-incident location, managed by the Operations Section, where incident personnel and equipment are assigned on a three-minute availability status.

Strike team: Specified combinations of the same kind and type of resources,

with common communications and a leader.

Strip burning: (1) Burning by strip firing. (2) In hazard reduction, burning narrow strips of fuel and leaving the rest of an area untreated by fire.

Strip firing: Setting fire to more than one strip of fuel and providing for the strips to burn together; frequently done in burning out against a wind where inner strips are fired first to create drafts which pull flames and sparks away from the control line.

SUA (special use airspace): Includes military operations areas (MOAs), restricted areas, prohibited areas, alert areas, warning areas and controlled firing areas.

Swamper: A firefighter who leads a bulldozer.

- T -

Tactics: Deploying and directing resources on an incident to accomplish the objectives designated by the overall strategy.

Target: The area or object intended for a retardant/water drop to cover, e.g., "Your target is the right flank."

Task force: Any combination of single resources, within the span of control, assembled for a particular tactical need, with common communications and a leader.

TFR (91.137): Temporary flight restriction; vertical and horizontal airspace in which non-incident aircraft are restricted from entry.

Tie in: To connect a retardant drop with a specified point, i.e., road, stream, previous drop, etc. "Tie in Tanker 62's drop with the road."
Tractor-plow: Any vehicle with a plow for exposing mineral soil, with transportation and personnel for its operation; used mainly in southern U.S.

Traffic pattern: The path or route aircraft traffic takes when landing or taking off or when performing tactical missions in the incident airspace or operations area.

Trail: To drop doors in sequence, resulting in a long, unbroken retardant line.

Trench: A small ditch often constructed below a fire on sloping ground

(undercut or underslung line) to catch rolling material (see **gutter trench**).

Turbine: Jet-propelled, as opposed to reciprocating, engine.

Typical operating weight: Maximum loaded hopper and equipped weight allowed under Civil Air Regulations (CAR) and Civil Aeronautics Manual (CAM) Part 8 of the Federal Air Regulations (FAR) 21.25 airworthiness certification for agricultural usage.

- U -

UHF (ultra high frequency): Common to military aircraft; incompatible with the VHF radio system. Operates in 300 to 3000 Mhz range.

Undercut line: Line constructed on a hillside when there is the possibility of burning materials rolling down and crossing the fireline; incorporates a trench into its construction. Can also be called trench line.

Unified command: A command structure which provides for all agencies or individuals with jurisdictional responsibilities, geographical or functional, to jointly manage an incident through a common set of objects.

Upwind (flight pattern): A flight path parallel to the direction of the final before turning cross-wind.

- V -

VHF (very high frequency): The standard aircraft radio that all civil and most military aircraft use to communicate with Federal Aviation Administration facilities and other aircraft.

VHF-AM (very high frequency/amplitude modulation): Aircraft radio range, 118 to 130 Mhz; used on wildland fire incidents for ground-to-air and air-to-air communications.

VHF-FM (very high frequency/frequency modulation): Multi-agency radio commonly used for dispatch, land-based mobile and airborne communications; operates in range of 150 Mhz to 174 Mhz.

Victor: Another way of referring to VHF-AM, e.g., “Come up on Victor.”

- W -

Water tender: Any ground vehicle capable of transporting specified quantities of water.

Wet line: Line constructed using water or foam to extinguish the flame front or to be used to burn from; except in VERY light fuel, a wet line should not be considered the final control line (which should be cut through the fuel to mineral soil).

Wetting agent: A chemical that reduces the surface tension of water and causes it to spread and penetrate more effectively.

Wet water: Water with added chemicals (wetting agents) that increase its spreading and penetrating properties.

Wildfire: Any fire on wildland except a fire under prescription.

Wildland: An area in which development is essentially nonexistent, except for roads, railroads, power lines and similar transportation facilities.

Wingspan: The length of a wing span from tip to tip; used to make low-level flight route adjustments, e.g., "Move your drop one wingspan to the right."

Working radius: Greatest calculated air flight distance the aircraft can travel with a full hopper going to a drop zone and returning unloaded at the unloaded consumption rate. Figures are based on estimated gallons per fuel consumption and air speeds supplied by manufacturers for loaded and unloaded working aircraft. Flight conditions are based on a windless standard air day, under 4000 feet altitude, with optimum working and mechanical conditions.