Alberta Provincial Airtanker Program

Firebombing Procedures Manual

2024

Revisions Since Previous Version

2.5 Airtanker Group or Air Attack Officer Export – New section. Information on requirements of the Air Attack Officer or Group Captain when exported outside of Alberta.

3.2 Daily Briefings – Updated to include the time of 9:30 am for the Daily Air Attack Officer Meeting.

4.5 Alberta Airtanker Alert Statuses – Separated response times for initial attack and sustained action/mutual aid during red alert. For sustained action or mutual aid airtanker requests, the birddog must roll immediately after mission planning is complete.

6.4 Airtanker Group and Airtanker Base Proficiency Practices – Renamed and added section describing the requirement and frequency for airtanker base proficiency practices.

3.2 Daily Briefings – Added section describing that the PAC may reduce the frequency of the Air Attack Officer meeting during extended periods of low wildfire hazard.

6.3 Air Attack Officer Preparedness – Updated description of when the Air Attack Officer shall be on base to take over their assigned group.

7.2 Sustained Action Airtanker Dispatches – Added a description of the responsibility of the Air Attack Officer to hold a pre-mission briefing before launching for sustained action missions and to do preplanning and preparation for anticipated sustained action ATRs.

9.1 Birddog Arrival over the Fire – Added the mandatory requirement to pass a list of information to pass to the Fire Centre during an update. Added an example.

9.5.2 Feasibility of Exits - Added statement to stay below the base of the stack when exiting.

10.3 General Airtanker Group Airspace Communication Procedures - New section but has information from sections 10.4 and 10.5. Added list of information the inbound airtanker must include when they established communications with their assigned birddog. Added an example. Added wording that airtankers should check in with their birddog if able and monitor bomb. Added instructions for airtankers if they are unable to establish communications with their assigned birddog.

10.11 Loss of Communications – New section. Procedures for loss of communications in various scenarios.

11.2 Stacking Procedures – Added an example and updated graphic (Figure 5)

12.6 Aircraft Overrun Procedures – New section. Description of procedures for aircraft overrun.

20. Stop Action - Added statement to follow up with Duty Officer or IC when airtanker operations are stopped due to beyond resources or safety

1. INTRODUCTION 8

1.1. Provincial Wildfire Objectives and Priorities within the Forest Protection Area 8
1.2. Airtanker Program Objectives and Priorities 9
1.3. Line Authority for Airtanker use in Wildfire Suppression 9

2. AIRTANKER OPERATIONS PREPAREDNESS 10

2.1. Air Attack Officer Responsibilities 10
2.1.1. Prior to Airtanker Group Arrival 10
2.1.2. Upon Airtanker Group Arrival 10
2.2. Airtanker Crew Responsibilities 10
2.3. Preparing for Operations 11
2.4. Import Airtanker Groups 11
2.5. Airtanker Group or Air Attack Officer Export 11

3. BRIEFINGS 12

3.1. Initial Basing and/or Re-positioning Briefings 12
3.2. Daily Briefings 12
3.3. After Action Reviews 13

4. AIRTANKER POSITIONING AND ALERTS 14

4.1. Airtanker Group positioning 14
4.2. Day-basing 14
4.3. Base Change 14
4.4. Daily Alberta Airtanker Alerts 14
4.5. Alberta Airtanker Alert Statuses 15

5. AIRTANKER GROUP DUTY DAY AND FLIGHT LIMITATIONS 15

5.1. Pilot Duty Day 15
5.2. Mandatory Rest Periods 15
5.3. Daily Maximum Flight Hours – Initial Attack Fires 16
5.4. Daily Maximum Flight Hours – Support Action Fires 16
5.5. Time Free from Duty 16
5.6. Grounding Times 17
5.7. Weather and Notice to Airmen – NOTAM 17

6. AIRCRAFT AND CREW READINESS/PREPAREDNESS 17

6.1. Aircraft Maintenance 17
6.2. Aircraft Pre-flight 17
6.3. Air Attack Officer Preparedness 18
6.4. Airtanker Group and Airtanker Base Proficiency Practices 19
6.5. Birddog Familiarization Flights 20

7. DISPATCHING PROCEDURES 20

7.1. Dispatch Information 21
7.2. Sustained Action Airtanker Dispatches 22
7.3. Mutual Aid Dispatches (outside the Forest Protection Area) 22
7.4. Loading 22
7.5. Recording Roll Times 23
7.6. Walk Around/Altimeter Setting/FLIR 23

8. ENROUTE 24

8.1. Departure 24
8.2. Airtanker Communication 24
8.3. Flight Following 24
8.4. Standard Airmanship - Cruising Altitudes 25
8.5. Cold Lake Air Weapons Range (CLAWR) 25
8.6. Class F Airspace Clearance Procedures 26
8.6.1. Approaching Class F Airspace with No Known Aircraft at the Wildfire 26
8.6.2. Approaching Class F Airspace with No Airspace Manager 26
8.6.3. Approaching Class F Airspace with an Airspace Manager 27

9. AIR ATTACK PLANNING 28

9.1. Birddog Arrival over the Fire 28
9.2. Airtanker Operations without Birddog Supervision 29
9.3. Air Attack Plans 29
9.3.1. Birddog Team Responsibilities 30
9.4. Risk Management / Decision Making 30
9.5. Assessing the Runs 31
9.5.1. Feasibility of Approaches 31
9.5.2. Feasibility of Exits 32
9.5.3. Target Altitude 32
9.5.4. Hazards 32
9.6. Firebombing Circuit 32

10. AIRSPACE MANAGEMENT 33

10.1. Incident Airspace Management 33
10.2. Air Advisory Frequencies – VHF-AM 34
10.3. General Airtanker Group Airspace Communication Procedures 34
10.4. Single Airtanker Group Airspace Communication Procedures 35
10.5. Multiple Airtanker Group Airspace Management Procedures 35
10.6. Establishment of an Altimeter Setting 35
10.7. Flight Priorities 36
10.8. Assigned Altitudes within the Fire Traffic Area 36
10.9. Integrated Helicopter Coordinator (HLCO) Operations 36
10.10. Managing Helicopters within the Fire Traffic Area 37
10.11. Loss of Communications 37
10.11.1. Before Entering the Fire Traffic Area 37
10.11.2. After Receiving Clearance into the Fire Traffic Area, Prior to Entering the Stack 37
10.11.3. After the Overhead Call and/or Established in the Stack Before Becoming Working Tanker (not number 1 tanker) 38
10.11.4. Once the Working Tanker (number 1) and at Any Time During the Run 38
10.11.5. After Receiving Exit Instructions 38
10.11.6. Skimmer Aircraft 38

11. STACKING PROCEDURES FOR RETARDANT AIRTANKERS 38

11.1. Aircraft Separation – Birddog and the Working Airtanker 39
11.2. Stacking Procedures 41
11.3. Stack Deconstruction – Dispersal of Aircraft from the Fire Traffic Area 43
11.4. Horizontal Separation (Racetrack Circuit) 43

11.5. Split Stack 44
12. TARGET IDENTIFICATION TECHNIQUES 44
12.1. Verbal Identification 44
12.2. The Demonstration Run 44
12.2.1. Demonstration Run Example 46
12.3. The Lead In 49
12.4. The Called Shot 50
12.5. Line Astern Formation 50
12.6. Aircraft Overrun Procedures 51
13. RETARDANT AIRTANKERS - DIRECT AND INDIRECT ATTACK 51
13.1. Direct Attack 51
13.2. Indirect Attack 52
13.3. Line-building Techniques 52
14. SKIMMER OPERATIONS 54
14.1. Skimmer Airtanker Operations 55
14.2. Integration of Land-Based and Skimmer Aircraft 57
15. MULTIPLE GROUP AIRTANKER OPERATIONS 58
15.1. Enroute 58
15.2. Support Birddog (Air Tactical Group Supervisor) Role Overhead the Incident 59
15.3. Incoming Aircraft 59
16. PROCEDURES FOR WORKING WITH MUTUAL AID AGRICULTURAL AIRCRAFT (PRAIRIE DOGS) 61
17. FACTORS INFLUENCING DROP PLACEMENT AND PATTERNS 61
18. ASSESSING THE DROP 62
18.1. Overhead Orbit 62
18.2. Flying in Formation 62
18.3. After the Drop 62
18.4. Drop Assessment 62
18.4.1. Drop Height 63
18.4.2. Drop Speed 63
19. RELOADING AIRTANKERS 64
20. STOP ACTION 64
21. CANCELLED DISPATCH 65
22. RETURNING TO BASE 65
22.1. Airtanker Action is Complete 65
22.2. Inbound the Airtanker Base 66
22.3. Aborting Loads 66
22.4. Landing 66
22.5. Parking Loaded Airtankers 67
22.6. Group back at the Airtanker Base 67
23. ADMINISTRATION 68
23.1. Drop Reports 68

23.2. Cancelled Dispatch Report 68
23.3. Wildfire Photos and Video 68
23.4. Forward-Looking Infrared (FLIR) 68
23.5. Quick strike/Border Zone/Mutual Aid Fire Procedures 69
23.6. Initial Fire Assessments (FP 41) 69
23.7. Daily Flight Reports (AO-02) 69
23.8. Flight Crew Meals 69

24. APPENDICES 71

24.1. Appendix 1 – Glossary of Firebombing Terms 71
24.2. Aquatic Invasive Species (AIS) Prevention and Decontamination Procedures 78
24.2.1. Imported Aircraft Decontamination Procedures 78
24.2.2. Preventing Whirling Disease Spread from Infected Areas 78
24.2.3. Aviation Decontamination Procedures 78

1. Introduction

Alberta Wildfire operates land-based and skimmer airtankers as components within a multi-faceted wildfire management strategy.

The province organizes its airtanker fleet into seven separate groups. Each airtanker group operates under the direction of an Air Attack Officer (AAO). However, each aircraft, birddog and airtanker, is considered to be its own entity, and may be temporarily assigned to other groups as required.

The airtanker fleet is provincial in nature. Aircraft and crews may be dispatched anywhere in the province from any of the 13 permanent airtanker bases, either as a result of specific fire requests or relocation to meet forecast fire occurrence.

The purpose of this manual is to ensure that the airtanker operations are conducted in a safe, efficient and cost-effective manner.

Information for this manual was derived from the following sources:

- Air Attack Officer Training Manual
- Wildfire Management Policy and Standard Operating Procedures Manual;
- Alberta Wildfire Pilot Handbook;
- Canadian Aviation Regulations and Standards (CARs)

1.1. Provincial Wildfire Objectives and Priorities within the Forest Protection Area

To ensure the provincial objectives are met, safe but aggressive initial attack shall be taken on all unwanted wildfires within the Forest Protection Area (FPA), with a goal to contain wildfire spread by 1000 hoursthe following day.

The wildfire priorities are (listed in order of highest priority):

- Human Life
- Communities
- Watershed and Soils
- Natural Resources
- Infrastructure

1.2. Airtanker Program Objectives and Priorities

As part of the province's policy to aggressively suppress unwanted wildfire, Alberta Wildfire's airtanker program objectives and priorities are:

Airtanker Objectives

- Quick containment
- Minimize size
- Minimize cost and damage

Airtanker Priorities

- Initial attack
- Support action within the first burning period
- Ongoing support action

Priority setting is the responsibility of the Forestry Manager, Wildfire Operations Officer, Forest Area Duty Officer and/or the Incident Commander, in conjunction with the Alberta Wildfire Coordination Center (AWCC) Duty Officer and the Provincial Aircraft Coordinator (PAC).

1.3. Line Authority for Airtanker use in Wildfire Suppression

Listed below is the line authority that Air Attack Officers will observe while working with airtanker groups within Alberta:

- Administration**:** Directly responsible to the Forest Area Duty Officer and/or the Provincial Aircraft Coordinator
- Initial attack**:** When assigned to an initial attack fire, the Air Attack Officer reports to the Incident Commander. The AAO will function as the Incident Commander until such time as ground personnel are on scene and have formally assumed command.
- Multiple fire action**:** Directly responsible to the Incident Commander on an individual fire, and Forest Area Duty Officer or designate (i.e. Wildfire Assessor) when working multiple fires.
- Support action**:** For assignments on support action for large incidents or complexes, the Air Attack Officer will report to a delegate of the Incident Commander on the Incident Command Team (Operations Section Chief, Air Operations Branch Director, Air Tactical Group Supervisor, Division Supervisor, etc.)

A safe and efficient airtanker program operation relies upon effective communication and situational awareness. Air Attack Officers will ensure that briefings are held as required.

2. Airtanker Operations Preparedness

With the arrival of airtanker groups at the start of the wildfire season, a period of orientation and briefing is required. The Air Attack Officer is responsible to prepare themselves and the airtanker group for operations.

2.1. Air Attack Officer Responsibilities

The Air Attack Officer that commences with an airtanker group starting contract takes on the responsibility for ensuring the group is in place at a specified time, facilitates the orientation of the group, ensures all briefings are performed, and readies the group for the start of their fire season.

2.1.1. Prior to Airtanker Group Arrival

Prior to the airtanker group arrival to the Airtanker Base, the AAO should:

- Be at the base to receive the airtanker group.
- Organize a Forest Area briefing, if required
- Check in and meet with the Airtanker Base Supervisor to determine Airtanker Base readiness (fuel, retardant, foam, parts storage, staffing, training required, etc.)

2.1.2. Upon Airtanker Group Arrival

- Meet and greet the airtanker crew. Start the process of building a team
- Facilitate introductions between airtanker base staff and crew
- Enable the offloading and storage of gear and spare parts
- Establish a schedule, and ensure initial Forest Area, base, and daily briefings are performed
- Ensure aircrew receive and sign-off on the *Airtanker Base Worksite Safety Orientation*
- Complete the airtanker group start of contract checklist with the airtanker crew

2.2. Airtanker Crew Responsibilities

Aircrew responsibilities when arriving at an assigned base include:

- Operation and maintenance of the aircraft
- Give aircraft-specific briefings to Air Attack Officers and airtanker base staff
    - Birddog pilots shall ensure each Air Attack Officer has received their training for “Personnel Assigned Duties Onboard an Aircraft”
- Orient themselves on:
    - Aircraft parking
    - Fueling procedures
    - Base equipment and facilities
- Orientation of base staff on the proper loading of the aircraft
- Operation of any equipment around the aircraft (i.e.: forklift, vehicles, etc.)
- Offloading and storage of any parts & equipment
- Arranging for required maintenance equipment over and above what the base provides

2.3. Preparing for Operations

When an airtanker group arrives at the beginning of the wildfire season, they will be provided with sufficient time to become “fire ready”. No pressure shall be put on the Air Attack Officer, and/or aircrew, to shortcut setup and briefing time to expedite dispatching the airtanker group.

It is recommended that the group complete at least one practice prior to commencing operations on an incident. The expectation is that all group personnel are adequately trained and prepared to perform their duties; however, every opportunity must be given to the members to form an effective team.

The PAC and Forest Area Duty Officer will be kept up to date on the group status, and notified when the group is fire ready.

2.4. Import Airtanker Groups

During times of high wildfire load, additional airtanker & birddog aircraft may be hired or imported from external jurisdictions under CIFFC Mutual Aid Resource Sharing (MARS) agreements.

Upon arrival of these resources, an Alberta Air Attack Officer may be assigned to ensure:

- Appropriate orientation and briefings are conducted
- Communication systems are in place to use Alberta’s Firenet FM radio network, and all frequencies are programmed correctly
- Logistical needs of the group personnel are met.

In the event that a birddog aircraft accompanies an imported airtanker group, one of the following may occur:

- Birddog arrives with an Air Attack Officer and a pilot from the supplying agency. In this case, a nationally certified Alberta AAO will be assigned to the airtanker group to check ride or mentor the birddog team. This may not be required if the visiting AAO is nationally certified and is familiar with long-term retardant and skimmer operations. The Alberta AAO will remain with the birddog until such time as they are satisfied with the performance of the imported birddog team.
- Birddog arrives with only the pilot. In this case, the Alberta AAO assigned to the resource will function as the Air Attack Officer in charge. If the birddog pilot has not worked in Alberta within the last year, a proficiency practice will be conducted prior to dispatching the group.

The PAC and Forest Area Duty Officer will be kept informed on the status of the group, and notified when the group is fire ready.

2.5. Airtanker Group or Air Attack Officer Export

In the event an airtanker group and/or Air Attack Officer are exported to another jurisdiction, upon arrival, the Air Attack Officer or Group Captain (if the airtanker is exported without the birddog) must ensure the following before fire operations:

- Appropriate orientation and briefings are conducted, including planned integration with jurisdictional resources
- Communication systems are in place, and all frequencies are programmed correctly
- Logistical needs of the group personnel are met.

3. Briefings

3.1. Initial Basing and/or Re-positioning Briefings

When an airtanker group is assigned to an airtanker base, be it the initial season deployment, or a base change during the season, the crew members will receive detailed briefings as follows:

- Forest Area Briefing

  An Alberta Wildfire staff representative from the Forest Area will provide an orientation (policies, local wildfire situation, contacts, maps, local information, special operation areas, etc.) and answer any group questions. This briefing is to take place as soon as practical following the group's arrival.
- Airtanker Base Worksite Safety Orientation

  The Airtanker Base Supervisor will ensure any individual entering the premises receives a base safety orientation before performing any duties on the base. Each individual must sign off the completed *Airtanker Base Worksite Safety Orientation* form, and the base supervisor will retain this information for the remainder of the season. Once signed off, this safety orientation is valid for that particular base for the remainder of the season.

3.2. Daily Briefings

Air Attack Officers on shift are expected to participate in daily briefings and communicate the relevant information to their group:

- Daily Weather Briefing

  The Provincial Weather section conducts two daily weather briefings at 10:30 am and 15:30 pm**.** AAOs are encouraged to attend the morning briefing in the Fire Centre and the afternoon briefing when possible.
- Forest Area Conference Calls

  Each Fire Centre holds a daily conference call with the wildfire resources. This allows all resources assigned to the area to receive information from the Forest Area Duty Officer, and an opportunity to discuss issues and concerns pertaining to the current situation. AAOs are encouraged to participate in the calls if possible.
- Daily Air Attack Officer Meeting

  All Air Attack Officers on shift will participate in the daily online meeting held at 9:30 am. This meeting is mandatory unless the airtanker group is involved in operations at the time of the call. AAOs are encouraged to participate in the meeting on the day prior to their shift to familiarize themselves with the current and expected wildfire situation.

During extended periods of low wildfire hazard, the PAC may reduce the frequency of the Air Attack Officer meeting. The PAC will communicate any deviations from the daily schedule in the comments section of the Alberta Airtanker Alerts.

Live Meeting sign in information is provided at the start of the wildfire season.

3.3. After Action Reviews

An informal post-mission after action review (AAR) is required after each mission/dispatch. Depending on the complexityor issues arising from the mission, a formal AAR may be held.

AARs are centered around four questions:

- What was expected to happen?
- What actually occurred?
- What went well and why?
- What can be improved and how?

An AAR features:

- An open, honest and professional discussion.
- Participation by everyone on the team, including engineers, ATB Supervisor and loaders, etc.
- A focus on results of the mission.
- Identification of ways to sustain what was done well.
- Development of recommendations on ways to overcome obstacles.

Suggested list of topics, include:

- Alerts
- Dispatch Information
- Loading/Retardant Quality
- Radios/Tracking/Satellite Phone
- Safety/Hazards
- Air Attack Plan/Objectives
- Decisions and Communications
- Run/Target Description
- Drop Assessments
- Aircraft and Tank System
- Ground Crews/Fire Centre
- Other Aircraft

Copies of all formal After Action Reviews are required to be emailed to the Lessons Learned site at: wf.lessonslearned@gov.ab.ca. Please cc the Forest Area, the PAC and the Airtanker Program Supervisor.

4. Airtanker Positioning and Alerts

4.1. Airtanker Group positioning

Airtanker group positioning within the Province of Alberta is a strategy to increase initial attack capacity and reduce containment times of wildfires.

The province has twelve primary and one secondary airtanker bases. The Provincial Aircraft Coordinator (PAC) is responsible to position airtanker groups to maximize initial attack effectiveness and coverage. The PAC will consult with the Forest Area Duty Officers to form a deployment plan best suited for the existing and forecast wildfire hazard. The Provincial Duty Officer will approve the plan.

4.2. Day-basing

Day-basing is a single-day strategic relocation of an airtanker resource within the province, to increase initial attack capacity and reduce the containment times of wildfires. Unlike a longer-term base change, the airtanker group is moved to the specified location for that day's alert period only, and will be returning to its home base for the night. Maintenance engineers or spare parts are not required to day-base. Airtanker groups should be fueled and fire-ready at the day base location by 13:00 or the scheduled red/yellow alert status, whichever is earlier.

While in transit to or from a day base, land-based airtankers will be loaded with water.

4.3. Base Change

This is a full relocation of the airtanker group to a different airtanker base. The airtanker group is expected to check out of the hotels and load all spares and cargo within two (2) hours. Every effort will be made to give advance notice of upcoming base changes. Upon arriving at the new location, the group can unload and arrange for practices, vehicles, accommodation, and meals depending on wildfire hazard and group status.

It is the responsibility of the airtanker group pilots to notify the Airtanker Base Supervisor when departing for a base change (with an ETA). The Airtanker Base Supervisor shall notify the Fire Centre of the departure time, so the ATR can be updated.

4.4. Daily Alberta Airtanker Alerts

In consultation with the Forest Area Duty Officers and the Provincial Duty Officer, the Provincial Aircraft Coordinator will build the daily Alberta Airtanker Alerts. The airtanker alerts will contain the alert status and times, airtanker positioning, sunrise & sunset times, the name of the AAO assigned to each airtanker group, and any other relevant notes as required. The form will be distributed to the Fire Centres, airtanker bases, AAOs, and program partners, typically by 17:00 on the previous day.

4.5. Alberta Airtanker Alert Statuses

Red	**Initial Attack:** Birddog wheels roll within 10 minutes after dispatch. **Sustained Action and Mutual Aid:** Birddog wheels roll immediately after mission planning completed. Personnel must be on base for the specified standby period and are to be prepared for immediate departure.
Yellow	Birddog wheels roll within 30 minutes from dispatch.
Blue	Birddog wheels roll within 1.1 hours from dispatch.
Green	The airtanker group is off duty (released from standby obligations) and can be away from base for a specified period. A green day must be scheduled 12 hours in advance.

5. Airtanker Group Duty Day and Flight Limitations

5.1. Pilot Duty Day

A pilot's duty day is restricted by the Canadian Aviation Regulations. This duty period is (14) fourteen hours in any 24 consecutive hours.

A pilot's duty day starts when a pilot:

- Reports for a flight,
- Commences standby that has a reporting time of one hour or less,
- Performs any duty required by the company, or
- Performs any duty designated by the Minister of Transport

A pilot's duty day ends when:

- The engine is turned off at the end of the final flight,
- Any required paperwork is completed,
- Any pilot performed fueling or maintenance is completed,
- At the end of a predetermined standby period, whichever is later.

5.2. Mandatory Rest Periods

A Mandatory Rest Period is a period of time in which the pilot is free from all duty, is not interrupted by the company, and is provided an opportunity to obtain not less than eight (8) consecutive hours sleep, time for meals and personal hygiene, and time to travel to and from the rest facility.

5.3. Daily Maximum Flight Hours – Initial Attack Fires

All airtankers and birddogs are permitted to fly a maximum of ten (10) hours, per day (wheels roll to wheels stop) on initial attack fires, based on the pilot's duty day.

If a flight crew has been actively flying on initial attack for an extended period of time, the Air Attack Officer and airtanker group pilots shall be consulted to determine if the maximum flight hours are required to be adjusted to reduce cumulative fatigue.

5.4. Daily Maximum Flight Hours – Support Action Fires

All airtankers and birddogs are permitted to fly a maximum of ten (10) hours (wheels roll to wheels stop), for the first day of support action and then a maximum of eight (8) hours, per day (wheels roll to wheels stop),for any subsequent days on support action, based on the pilot's duty day.

If a flight crew has been actively flying on initial attack immediately prior to being assigned to support action, the Air Attack Officer and group pilots shall be consulted to determine if the maximum flight hours are required to be adjusted to reduce cumulative fatigue.

5.5. Time Free from Duty

CARs 700.19(1) an air operator shall provide each flight crewmember with time free from duty:

- 3 days within each 30 consecutive days
- 5 days within each 42 consecutive days
- 13 days within each 90 consecutive days

CARs 720.15 Flight Time Limitations

- 60 hours in any 7 consecutive days
- 150 hours in any 30 consecutive days
- 210 hours in any 42 consecutive days
- 450 hours in any 90 consecutive days

As per the airtanker companies' Operation Specification, pilots are free from duty if the airtanker group is:

- Assigned to a green alert, and does not fly during that period.
- Assigned to a blue alert, not required to be on base, has 1.1 hours to respond to a dispatch, is not called to report to the airtanker base during a blue alert period,and the crew had been advised of the alert a minimum of 12 hours prior to the alert period commencing.

The aircraft companies will track "Days Free from Duty" for airtanker groups.

5.6. Grounding Times

Firebombing operations are restricted to daytime Visual Flight Rules (VFR) conditions within the period of time commencing one half hour before sunrise and ending one half-hour after sunset. An exception to this regulation applies to Instrument Flight Rules (IFR)-rated pilots within properly equipped aircraft, as they may fly at night VFR or IFR. This exception does not apply to actual firebombing on a target and is authorized for flights to and from a fire or another airstrip only. All contract birddogs and airtankers are certified and equipped for IFR flight, with the exception of the AT-802F and FireBoss aircraft. AT-802F and FireBoss aircraft are permitted to fly in nighttime VFR conditions. Birddogs equipped with FLIR cameras are not permitted to fly in known icing conditions, the FLIR camera must be removed prior to any flights that may encounter icing conditions. The CL-215T are not permitted to fly in temperatures seven degrees Celsius or below in visible moisture.

5.7. Weather and Notice to Airmen – NOTAM

Pilots are required to be informed on current and forecast weather conditions, and any notices to airmen (NOTAMs) that may affect flight operations. Air Attack Officers are expected to remain informed, and to understand the implications that may affect air attack operations.

6. Aircraft and Crew Readiness/Preparedness

6.1. Aircraft Maintenance

Aircraft maintenance engineers (AMEs) and pilots shall plan their maintenance duties to avoid conflict with the airtanker group's ability to meet the alert response times. All Alberta airtanker bases have maintenance facilities, which provide for aircraft spares storage and workspace for the AMEs to use.

In the event that an aircraft becomes unserviceable during an alert period, the aircraft unserviceability must be reported to the Forest Area Duty Officer immediately. The Air Attack Officer/Airtanker Base Supervisor will ensure the *Aircraft Unserviceability Form* (FP 26) is filled out and emailed to the Fire Centre and to the PAC at the AWCC. The form will include an estimated time to return to service, if known, after consultation with the maintenance staff.

6.2. Aircraft Pre-flight

Daily inspections are to be conducted according to the coloured alert status, to avoid any conflicts with expected response times. Air Attack officers are strongly encouraged to become familiar with, and involved in the daily inspection routines of the assigned birddog aircraft. Communication and collaboration with the birddog pilot is key to ensuring safety. The AAO must be familiar with the aircraft's basic systems, instruments, and operation, including a rudimentary knowledge of emergency procedures. Work with the birddog pilot to ensure this becomes second nature.

6.3. Air Attack Officer Preparedness

To prepare for duty, the Air Attack Officer shall:

- Be on base and ready to take over their assigned group by 10:00 on the first day of their scheduled shift or one hour prior to the start of the airtanker group's alert, whichever is earlier.
- Have a flight bag (AAO kit & personal effects for an overnight stay) packed and carried aboard all flights.
- Daily Inspect (DI) the equipment that the AAO is responsible for in the birddog aircraft. This includes FLIR equipment and recording devices, FM radios, siren, iPad, map books and group AAO kit.
- Review, understand, and communicate the fire weather forecast, fire weather indices, fire behaviour prediction system, fire occurrence-lightning location maps, human-caused probabilities and location, resource preparedness sheets, and provincial airtanker alerts.
- Review current provincial fire load as well as locations.
- Determine the Fire Centre organization and contacts.
- Initial attack and support resource deployments.
- Anticipate work for the day (i.e. support, lightning storms, etc.), and safety concerns.
- Meet with the Airtanker Base Supervisor and review the readiness of the airtanker base, including:
    - Condition of mixing/ loading equipment and storage facilities.
    - Quality control of fire retardant i.e. salt content, viscosity.
    - Verify the liquid concentrate retardant stock on hand can meet the anticipated demand.
    - Fuel, oil and water-methanol stocking levels, condition of fueling equipment and the fuel being supplied.
    - Aircraft parking and dispatch procedures (i.e. multi group).
    - Inspect the base or operation from a safety standpoint and take corrective action against hazards.
- Complete the FP 249 - *Passenger and Cargo Manifest* form. Submit a copy to the Fire Centre.
- Monitor crew fatigue, morale, and safety.
- Keep the Forest Area Duty Officer apprised as to the status of the airtanker group.

6.4. Airtanker Group and Airtanker Base Proficiency Practices

A correlation between periods of low airtanker activity and an increase in accidents and incidents has been observed. Airtanker practices are carried out during periods of inactivity to help ensure aircrews, support staff, equipment and air attack procedures are current and functional. A sense of complacency may build during periods of inactivity. Proficiency practice frequency shall be:

- Airtanker groups will carry out two proficiency practices during the first week of the start of contract.
- Airtanker groups are required to practice every six days if they have had no fire action in the previous five.
- When an airtanker group is positioned to an eastern-slopes base (Springbank, Pincher Creek, Rocky Mountain House, Edson or Grande Prairie), the group will undertake one proficiency practice in mountainous terrain as soon as practical.

The decision to practice will be at the discretion of the Air Attack Officer in consultation with the Forest Area Duty Officer. Practices shall not be postponed due to anticipated fire activity; such times have proven to account for an inordinate number of incidents and accidents. Practices should only be postponed for safety reasons, usually weather-related. Other considerations for proficiency practices:

- Before initiating a practice, check with the Forest Area Duty Officer to enquire if it is feasible to incorporate the airtanker practice with any ground crew training, or to support local projects.
- Fire retardant may be used in practices with the approval of the Provincial Aircraft Coordinator.
- All fire retardant jettisoned on a practice must be dropped in an approved abort zone or in a location approved by the Forest Area Duty Officer, and have the volume entered into the FIRES database.
- Practices with land-based airtankers should allow for an initial load and one reload for each airtanker.
- Practices with skimmer aircraft should allow for 4 loads per airtanker
- Multi-group practices are encouraged to promote cross training between the different airtanker types.
- AAOs are encouraged to learn aircraft systems and procedures, and to assist the pilot during emergencies
- Instrument-rated groups may opt to practice IFR approaches and landing on a practice day if the weather will not permit a regular practice

Airtanker base staff are required to practice every six days if they have had no fire action or airtanker group proficiency practices in the previous five. Practices must be documented.

6.5. Birddog Familiarization Flights

Familiarization flights are conducted by birddog pilots and Air Attack Officers to ensure each are clear about their functions within the cockpit. This will avoid in-flight confusion between the birddog team members and help maintain a safe, well-coordinated operation. Familiarization flights are normally made at the beginning of each season, whenever there is a new pairing of individuals who do not routinely work together, or when utilizing an unfamiliar aircraft type. The following are procedures to be covered; they may be adjusted according to the experience levels of both individuals.

- Pre-flight: Following an initial base briefing, an aircraft inspection will include a thorough safety briefing, review of the use of avionics and cockpit instruments, discuss dispatch procedures and individual responsibilities throughout the mission, and review any emergency procedures. Pilots unfamiliar with a particular airtanker base will benefit from a review of local topographical features and visual checkpoints near the airport.
- In-flight: Points to cover during a familiarization exercise include: AAO preferences while orbiting during the initial fire reconnaissance, aerial suppression strategies, demonstration runs and run descriptions, birddog aircraft positioning overhead the fire, airspace management, task distribution, hazard identification, communication procedures, etc.

Simulated targets should be flown in areas featuring differing topography and fuel types. Upon completion, a short debriefing should resolve any discrepancies found during the flight. The Air Attack Officer and birddog pilot should be thoroughly aware of each other's functions in all phases of aerial attack.

7. Dispatching Procedures

The dispatching of airtanker resources is the responsibility of the Forest Area Duty Officer, who administers wildfire operations for the area in which the airtanker resource is currently located. Forest Areas may dispatch an airtanker group positioned in their Forest Area, to a fire within their boundaries or designated reload zone, without AWCC intervention. The PAC is responsible for filling ATRs and has the authority to override any airtanker dispatch.
The Forest Area Duty Officer or designate is responsible to create an Airtanker Request (ATR) in the Alberta Dispatch system. Any information entered into the system is instantly disseminated to all individuals involved in executing an airtanker dispatch.

The following is a guide designed to summarize the order of events from the time the Airtanker Base Supervisor receives a group dispatch request from the Fire Centre until the airtankers become airborne.

7.1. Dispatch Information

The Fire Centre that is responsible for the base at which the group is located will initiate the dispatch of an airtanker group.

The Airtanker Base Supervisor is responsible for alerting the airtanker group of a dispatch. If the airtanker group is not on base (e.g. yellow or blue alerts), the ATBS will notify the AAO. The AAO will notify the rest of the group. If the airtanker group is on base, the Airtanker Base Supervisor will activate the dispatch siren (klaxon) and follow up with verbal announcement over the base PA system as to which group or specific aircraft are being dispatched.

The Air Attack Officer, upon hearing the dispatch siren, will proceed to the operations room of the Airtanker Base, and request the following basic dispatch information from the Airtanker Base Supervisor:

- Detection/Fire Number
- Location – Latitude/Longitude coordinates given in Degrees, Minutes, Decimals.
- Bearing (in degrees) and Distance (in nautical miles)

Pilots, upon hearing the dispatch siren, will proceed directly to their aircraft and prepare their aircraft for departure. They may receive their basic dispatch information (lat. /long, bearing, distance and detection/fire number) from the Airtanker Base Supervisor via a printout of the ATR or via the VHF-AM radio (base frequency of 122.050).

Note: All aircraft shall monitor 122.050 VHF-AM when operating within the airtanker base ramp, loading pits and taxiway areas.

The Forest Area Dispatch is responsible for sending the electronic Dispatch Information to the airtanker group email and/or passing it verbally over the radio. Electronic Dispatch Information will typically be sent when the entire airtanker group is dispatched, not to individual airtankers. The Dispatch Information should include the following, if available:

1. Detection/Fire Number
2. Location – Latitude/Longitude coordinates given in Degrees, Minutes, Decimals. Including geographic reference (if available)
3. Resources and their ETAs
4. Frequencies
5. Incident Commander/Contact
6. Any additional information. i.e. Fires in close proximity.

The Air Attack Officer shall request any updates to the Dispatch Information after departure, or request the Dispatch Information to be passed verbally over the radio if the group did not receive it electronically via email.

In the event of a tanker-only dispatch to another birddog, the airtanker pilot(s) require the following information:

1. Detection/Fire Number
2. Location – Latitude/Longitude coordinates given in Degrees, Minutes, Decimals. Including geographic reference (if available)
3. Group bombing frequency of the working birddog or air advisory if ATGS is established
4. Working birddog or ATGS call sign

Airtankers must not depart without this information. The ATBS or the Air Attack Officer are responsible for following up with the Forest Area Dispatch to gather this information.

Note: The lead airtanker pilot shall advise the ATBS of the ETA to the incident, who will then pass this information to the Fire Centre to be entered into the active ATR.

7.2. Sustained Action Airtanker Dispatches

Prior to requesting airtankers for support on sustained action, the Incident Commander or designate must ensure that the target area of the fire has been assessed to ensure the visibility requirements (minimum 3 miles) are met, and that achievable objectives exist.
Once the airtanker request (ATR) is submitted, the responding Air Attack Officer must obtain all required Dispatch Information and incident maps prior to launching. If the visibility or mission objectives are unclear, the AAO may request to assess the target area in the birddog prior to launching airtankers. The Air Attack Officer is responsible for holding a quick group briefing prior to launching to ensure mission objectives are clear, incident maps are distributed, and flight routes are planned. All efforts should be made to plan for sustained action missions before airtanker requests are submitted (e.g. loading incident maps of potential support missions on iPad, reviewing IAPs and comms plans in the morning).

7.3. Mutual Aid Dispatches (outside the Forest Protection Area)

Occasionally, airtankers are requested to action mutual aid fires outside the Forest Protection Area. Due to the complexity, potential hazards and potential for conflict with civilian personnel on the ground, an Alberta Wildfire representative must be on site prior to any airtanker drops.
Once the airtanker request (ATR) is submitted, the responding Air Attack Officer must obtain all required Dispatch Information prior to launching**.** If the visibility or mission objectives are unclear, the AAO may request to assess the target area in the birddog prior to launching airtankers.

7.4. Loading

The airtanker base loader is responsible for loading the airtanker(s). Aircraft company maintenance staff may be present in the loading pits to marshal the aircraft; check the mechanical condition of the aircraft, and ensure the loading procedures are being conducted safely. A set of red and green ‘traffic’ lights is located next to all loading pits. These lights visually indicate which pit is actively loading airtankers. The colors indicate: green (loading), and red (not loading). A red light may also indicate a dispatch has been cancelled.
A designated safety area will be marked (painted and/or flagged) adjacent to every loading pit at all airtanker bases. After the loader has completed loading the airtanker, they will safely exit to this

designated safety area and give a thumbs-up signal to the airtanker pilot. Prior to the airtanker departing the loading pit:

- The airtanker pilot must call on the radio: “Confirm all clear, Roll Time for (tanker number)”
- The Airtanker Base Supervisor will visually confirm that the loader is clear and call on the radio “*Loader clear, (tanker number) Roll Time xx:xx*”
- The airtanker shall not move until all ground personnel confirmed to be clear.

When two or more groups are located at the same base, the Airtanker Base Supervisor will coordinate the order of airtanker loading and departure with the Air Attack Officers. For example:

- Two or more land-based groups on a single-pit base, the airtanker in the loading pit will load first.
- Two or more land-based groups on a dual-pit base: one airtanker from each group should be in a loading pit. If the groups are on differing alerts (i.e.: one Red, one Yellow) the airtankers from the group on the highest alert shall be positioned in the loading pits.
- Land-based and skimmer groups on base, the ATBS should activate the dispatch siren and make a PA announcement confirming the specific group(s) being dispatched.

7.5. Recording Roll Times

The ATBS will record airtanker(s) roll and stop times, and ensure that they are recorded into the FIRES program. The ATBS will pass these times to pilots over the radio.

An airtanker’s roll time commences when it first moves from the loading pit after loading. Time does not start when an airtanker leaves its parking space for the loading pit. The time is recorded when the airtanker returns from the flight and comes to its initial stop at the airtanker base. This could be at its parking space, the fuel pumps, loading pad or at the end of theline for a reload. Any time spent in the reload line or waiting for fuel will not be recorded

If an airtanker or birddog is refueled off the airtanker base apron itself, record the stop time at the fueling location, 0.1 hours will be added for the reposition back to the airtanker base.
Aircraft movements to adjust heading into wind or away from obstacles will not be considered revenue time (no wheels-roll or stop times recorded).

The Air Attack Officer will record the birddog wheels roll and stop times as they occur. The AAO is also responsible for providing these times to the pilot for completion of daily flight reports.

7.6. Walk Around/Altimeter Setting/FLIR

Prior to departing, the AAO shall:

- Ensure a pre-flight walk around (inspection) of the birddog is complete.
- Ensure the current airport altimeter setting is recorded.
- Ensure that the FLIR camera is powered up when the birddog aircraft avionics are turned on.
- Ensure a memory drive is in the recording device.

8. Enroute

8.1. Departure

Once the birddog aircraft is airborne, the Air Attack Officer will establish communications with the Fire Centre using the assigned Firenet frequency and relay the following information:

- Destination of the mission (confirm incident number if applicable)
- Forestry payload manifest & weight
- Estimated Time of Arrival, using 24hr time (e.g. “ETA is 14:20”. Do not use estimated time *duration* of flight).
- Request dispatch information if not already provided

Upon clearing the airport control zone and when practical to do so, the birddog team willtune the VHF-AM radios to the group bombing and air advisory frequencies. Similarly, each airtanker will switch to the group bombing frequency and report into the birddog aircraft. Aircraft are expected to be vigilant for unexpected wildfires while enroute. Airtanker pilots will report any observed smoke to the Air Attack Officer.

8.2. Airtanker Communication

Once all airtankers have advised that they are monitoring the bombing frequency, the birddog team will confirm the following:

- Altimeter Setting
- Incident number and location
- Closest reload source for the land-based and closest lake for skimmer airtankers
- Other aircraft and any known hazards
- The airtankers will pass their ETA to the fire to the birddog

In the event of a tanker-only dispatch to another birddog, each airtanker will have their satellite phone switched on to receive calls for diversions, cancellation or updates to their dispatch. With multiplane airtanker groups, typically one airtanker will be contacted and expected to relay the information to the rest of group. The airtanker(s) may also use the satellite phone to contact the local Forest Area or PAC if required. Phone numbers are listed on the the Air Attack VHF-AM Radio Frequencies and Phone Numbers sheet.

8.3. Flight Following

Flight following will be provided by a combination of direct radio contact between the aircraft and the radio room and the use of the Dispatch program. Aircraft will report all takeoffs, landings and deviations to the Fire Centre over the radio. The Air Attack Officer will adhere to the established flight following rules as defined in the Alberta Wildfire Standard Operating Procedures. If connectivity issues do not permit flight following to be completed through the Dispatch system, verbal 30-minute check-ins are required.

When the birddog crosses a Forest Area boundary, the Air Attack Officer will:

- Advise the Fire Centre of the area they are leaving that they will be switching frequencies to the Fire Centre they are entering.
- Establish communication with the new Fire Centre using the applicable Firenet frequency, confirming ETA to the destination.
- Request updated Dispatch Information

8.4. Standard Airmanship - Cruising Altitudes

All aircraft operating within the Fire Traffic Area (fire) will be assigned corridors and altitudes by the airspace manager. Outside the FTA, aircraft above 3000' AGL are expected to adhere to VFR cruising orders as defined in the Transport Canada Aeronautical Information Manual (TC AIM):

Heading	Altitude
West Track (180- 359 degrees)	Even Altitude + 500ft.
East Track (000- 179degrees)	Odd Altitude +500ft.

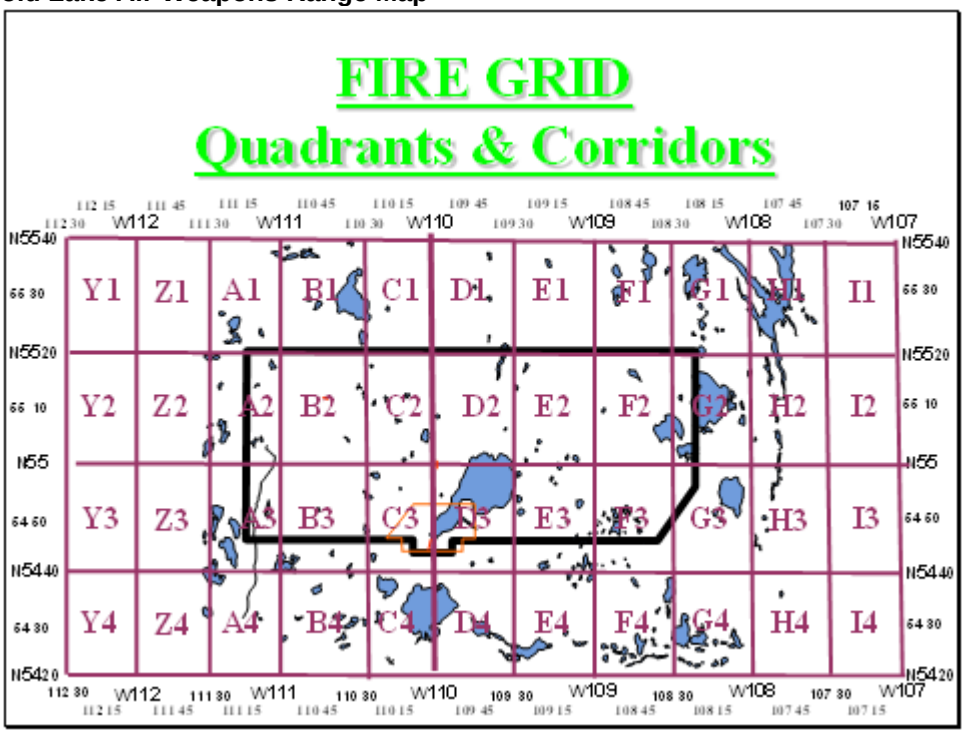
To increase horizontal separation, aircraft will offset 1.0-mile right of track.

8.5. Cold Lake Air Weapons Range (CLAWR)

The province retains responsibility for fire suppression within the Cold Lake Air Weapons Range. The Lac La Biche Forest Area is responsible for all fire operations involving the Range and will advise the Range entry point and any restrictions to be observed. Clearance must be received from the Lac La Biche Fire Centre before entering the CLAWR.

Upon clearance by the Fire Centre, the pilot will contact the tower at CFB Cold Lake (the Fire Centre will confirm the frequency). Reception may be difficult at the north end of the Range, requiring a gain in altitude to establish contact. If the pilot is unable to contact the tower, the AAO will contact the Lac La Biche Fire Centre and they will notify the tower by phone. Aircraft may not proceed into the CLAWR until they have confirmed that Cold Lake Tower has been notified and clearance instructions are received.

FIGURE 1. Cold Lake Air Weapons Range Map



8.6. Class F Airspace Clearance Procedures

The following procedures apply to birddog aircraft and helicopters. Airspace clearance procedures for airtankers are described in Section 10.3. While transiting to and from wildfires outside Class F airspaces, aircraft are expected to monitor the enroute frequency 126.700 MHz and the assigned air advisory frequency if possible.

- For initial attack, the primary air advisory frequency is 129.800 MHz unless advised of an alternate.
- For sustained action, the primary air advisory frequency is 130.175 MHz North of 53^0 latitude and 122.650 MHz South of 53^0 latitude unless advised of an alternate.
- Ensure your transponder is on squawk code 1200 or as assigned by ATC.

8.6.1. Approaching Class F Airspace with No Known Aircraft at the Wildfire

If no known aircraft are at the wildfire, make an advisory call 5 minutes back on the assigned air advisory frequency, communicating your registration/call sign, fire number, altitude, direction of approach, intentions and frequencies monitoring.

8.6.2. Approaching Class F Airspace with No Airspace Manager

If there is no airspace manager (ATGS, birddog or HLCO), all inbound aircraft will contact any known aircraft 5 minutes back from the wildfire on the assigned air advisory frequency. If no response, remain outside the restricted Fire Traffic Area (5 nautical miles) and advise the Forest Area Dispatch. Confirm the assigned air advisory frequency and aircraft registrations with the Fire Centre. Do not proceed inbound until positive communications have been established.

All aircraft operating within an unmanaged Fire Traffic Area will broadcast their movements and maintain their own separation using the assigned air advisory frequency.

8.6.3. Approaching Class F Airspace with an Airspace Manager

If an airspace manager (ATGS, birddog or HLCO) is activated, all aircraft must call the airspace manager a minimum of 5 minutes back from the wildfire on the assigned air advisory frequency. If no response, remain outside the Fire Traffic Area (5 nautical miles) and advise the Forest Area Dispatch. Confirm the assigned air advisory frequency and aircraft registrations with the Fire Centre. Do not proceed inbound until communications are established.

The Airspace Manager will require:

- Your aircraft registration/callsign
- Your location (distance in NM), direction of approach, altitude
- Your intentions over the fire

Example: “Birddog 132, this is ABC on air advisory…5 minutes back from the west of HWF 123, 3500 feet…I would like to drop off my crew off at the back of the fire”

The Airspace Manager will provide:

- An altimeter setting
- Entry clearance and/or holding instructions
- Information on other aircraft on scene

When operating within the Fire Traffic Area with an airspace manager (ATGS, birddog, or HLCO), all aircraft shall contact the airspace manager on the assigned air advisory for clearance instructions into or out of the FTA before they lift off or deviate from an approved task.

9. Air Attack Planning

9.1. Birddog Arrival over the Fire

Depending upon the topography relative to the physical location of the fire, the birddog aircraft will fly overhead the fire in a right-hand orbit at 1,000 ft. to 2000 ft. above ground. The birddog pilot will endeavour to ensure the Air Attack Officer has an unobstructed view of the fire and its surroundings. Prior to commencing firebombing, the birddog team will:

- Continue managing the airspace.
- Notify other aircraft in the area that you are over the fire, and give the ETA for dispatched airtanker(s) if known.
- Remain in a high-level orbit until positive airspace control of all aircraft has been established.
- Capture digital photos of the fire upon initial arrival. Email photos to the Fire Centre Wildfire Ops and AWCC email accounts.
- Confirm whether an *Initial Fire Assessment* has been completed, and coordinate that assessment with any ground crews present.
- Confirm the fire location with the GPS. Relay updated coordinates as required to the Fire Centre.
- Make a sketch* of the fire, noting:
    - Perimeter
    - Spread Direction
    - North Arrow
    - Hazards
    - Terrain
    - Exits
    - Geographic Points
    - Direction of Possible Runs and/or Circuits

*The sketch may be hand-drawn, drawn using an app-based tool, or by a Markup tool on tablet photos.

- Confirm the cardinal directions with the birddog pilot, other aircraft and ground crews.
    - Use simple references like seismic lines, lakes, wind direction, etc.
    - Use standard terminology: head; tail; right flank; and left flank; spot fire; finger; etc.
- Check with the incident commander (if present) for the ground crew's current attack plan.
- Formulate an air attack plan based upon assessment and available/anticipated resources.
- Keep the ground crew apprised of the birddog intentions.
- The Air Attack Officer may assign priorities in multiple fire situations, if a Wildfire Assessor is not present.
- Once the incident is assessed, the Air Attack Officer MUST pass the following information to the Incident Commander and/or Fire Centre:
    - Fire size
    - Head Fire Intensity
    - Fuel type including any changes in fuel type

- Values (location, distance and level of threat)
- Action plan and objectives
- Number of rounds required (for retardant airtankers) and estimated bombing time (for skimmer airtankers) until completion of the air attack operation.
- Any anticipated birddog replacement.

Example: " The fire is 30 hectares, HFI 4 at the head and 2 on the flanks, burning in C2, there is oil and gas activity 10 km south of the fire but not currently threatened, we are planning to put retardant across the head and then will box in the fire, anticipating 8 rounds of retardant and will require a birddog replacement at 1330."

Request additional resources as required. When requesting additional airtankers, the request must include the following information:

- Type of airtanker group required (long term retardant or skimmer)
- Number of airtankers required
- Airtanker(s) only or entire group including the birddog
- The working birddog on the fire to report to
- The group bombing frequency.

Example: "I would like to request one long term retardant airtanker group, tanker only, birddog not required, the airtanker is to report to birddog 56 on Group 3's bombing frequency"

9.2. Airtanker Operations without Birddog Supervision

The practice of conducting low-level drops without birddog team supervision (often termed 'lone wolfing') is prohibited in the province of Alberta.

The exception is dropping retardant in an approved abort zone. If no birddog team is available, the airtanker pilot must conduct a high-level pass to confirm the intended drop area is clear of hazards, and the drop height shall be a minimum of 500 feet AGL.

9.3. Air Attack Plans

With the information gathered from the assessment, and the number and types of airtanker(s) available, the Air Attack Officer will begin to formulate a possible attack plan.

If an Incident Commander is on scene, the AAO will establish initial communications with the IC to formulate an agreeable aerial suppression plan. Based upon the Incident Commander's requirements and the Air Attack Officer's knowledge of aircraft capabilities, a final air attack plan with definite objectives is formed. If the Air Attack Officer is unable to achieve the IC's objectives, the AAO will recommend alternative options to the Incident Commander.

The air attack plan will include where to action the fire first, the sequence and type of drops. The fire sketch will assist in orientation and describing the attack plan to the pilot. The use of proper terminology

is important to this description. Once the plan has been formed, prepare for the arrival of the airtankers. Be ready to commence suppression activities as soon as possible.

9.3.1. Birddog Team Responsibilities

When directing and coordinating an airtanker operation, the birddog team must be aware of what each other is doing while still acting independently. They need to keep each other informed of what is happening with their workload. Each is responsible for the following:

The Air Attack Officer:

- Coordinates the planned attack
- Directs the airtanker through the birddog pilot
- Manages the airspace for non-airtanker aircraft in the Fire Traffic Area*
- Communicates to ground crews and the Fire Centre

The birddog pilot:

- Ensures safe flight of the birddog aircraft
- Manages the airtanker group's movements*
- Communicates the bombing run description to the airtanker pilot(s)*

*These tasks may be done by either Air Attack Officer or the birddog pilot based on cockpit workload and experience of the team members, but as a rule of thumb, follow the above separation of duties.

9.4. Risk Management / Decision Making

Decisions must be made with safety as the primary consideration. The birddog team must maintain situational awareness during all aspects of the firebombing operation. Planning the intended airtanker runs begins when the birddog is orbiting the fire at a high altitude and is followed up by descending to lower altitudes to check the runs.

Safety Decisions at "High Altitude"

Always take advantage of the 'big picture' from a high altitude perspective. Focus should not be limited to the immediate fire area; it is necessary to assess any fuel type changes, natural guard potential or values at risk ahead of the fire. The following factors may limit aerial fire suppression tactics:

- Prevailing winds - strength and direction, mountain effects
- Turbulence - mechanical, atmospheric and fire-generated
- Downdrafts - lee side of hills, thunderstorm and fire-generated
- Visibility - smoke, cloud, rain, remaining daylight, valley shadowing and sun glare
- Precipitation - visibility, potential for hail associated with thunderstorm activity
- Lightning - may be an indication of worsening weather/wind/visibility
- Terrain - will dictate orientation, run direction and retardant placement possibilities
- Obstructions - power lines, cables, tall trees, snags, towers and proximity to built-up areas may restrict low level work
- Aircraft over the incident - firefighting, commercial and transient aircraft.

NOTE: The recommended minimum altitude to fly above powerlines is 100' above the top of the poles/towers. Avoid dropping directly on poles/towers in order to prevent damage to insulators & transformers, or an inadvertent arcing electrical short.

Prior to Descent

- The birddog team will determine cardinal directions based upon prominent topographic, geographic or manmade features. Example: "The valley runs north to south".
- The birddog team will determine mission objectives and the aerial suppression plan. Example: "We have a spot fire on a steep slope. The airtanker will blanket the fire, stepping up the hill from left to right, on down-valley runs"
- The Air Attack Officer should ensure that all items and procedures that could cause distraction at low altitudes are dealt with prior to descent (i.e. radio work)

Safety Decisions at "Low Altitude"

All group members must maintain situational awareness at all times, and determine:

- What has happened?
- What is happening now?
- What might happen next and later?

If visibility is restricted or the wind conditions are difficult to read, the birddog pilot may fly the initial low-level passes at a higher altitude than required, in order to assess the conditions. The birddog team will identify hazards, escape routes and flight paths. If hazards pose too great a risk, the Air Attack Officer will terminate the mission and advise the ground crew and the Fire Centre.

If the hazards and risk appear to be acceptable to the birddog team, they will determine the circuit pattern. When determining bombing run directions, the team will ensure that all exits are level or descending, remaining clear of any hazards.

9.5. Assessing the Runs

Prior to identifying the target to the airtanker pilot and in full consideration of the risk management/decision making aspects, the birddog team will check out the initial bombing runs for:

9.5.1. Feasibility of Approaches

Left-hand circuits are preferred by two-crew airtanker types, in order for the flying captain to better keep the target in sight throughout the circuit. Terrain and visibility restrictions may limit the circuit to right-hand only. The birddog team will broadcast any hazards, geographical features and ridge crossing altitudes to assist airtankers in setting up their flight profile through the circuit.

The, birddog team will ensure that steep turns in a bombing circuit do not exceed limitations specified in company operation manuals. Any angle of bank in excess of 30 degrees must be identified to the airtanker pilot, to a maximum permitted angle of bank of 45 degrees.

Up-valley bombing runs must always allow room for a 180-degree turn to exit down-valley. The birddog team will note any prominent landmarks or features that may be described to assist in identifying the line and trigger point to the airtanker pilots.

9.5.2. Feasibility of Exits

Bombing runs into rising terrain are prohibited. Runs must allow a loaded airtanker to exit safely in the event of a loss in power or inability to jettison the retardant load. The aircraft must always be in a position to depart the area without the need to climb and stay at an altitude below the base of the stack; exits will always be flown level or downhill.

9.5.3. Target Altitude

Target altitude is the actual altitude as read from the altimeter as the birddog passes overhead the target at the correct bombing height above obstructions. Calling the altitude allows the airtanker to fly an appropriate flight profile to the target when in the bombing circuit. The specified bombing height above ground may be adjusted due to weather, visibility, wind, and/or terrain conditions.

When flying multiple runs perpendicular to the slope in steep terrain, the birddog team must check the feasibility of every run and exit, and provide accurate target altitudes to the airtanker.

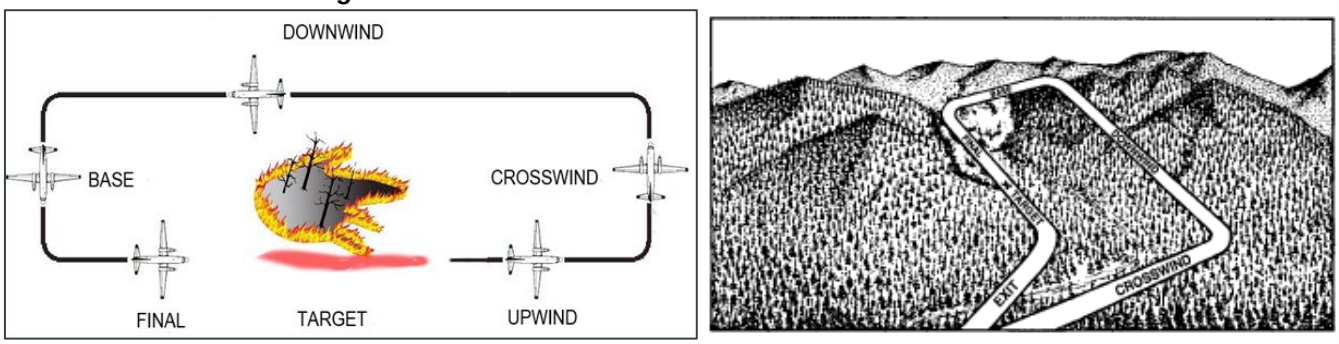
9.5.4. Hazards

Any previously identified (during the “high altitude” assessment) existing hazards will be reaffirmed when checking the runs. In addition, any hazards identified during the low-level assessment (i.e. descending air, turbulence, smoke, sun glare, shadows, etc.) must be communicated to airtankers.

9.6. Firebombing Circuit

The circuit or traffic pattern over a fire is the same to that used over an aerodrome (airports). Typically, aircraft will land into wind at an airport; the basic firebombing circuit may be flown independent of wind direction. The terms (crosswind, downwind, base, final, and exit) quickly identify an aircraft’s position in relation to the target. Left hand circuits are preferable so pilot(s) can keep the target in sight at all times.

FIGURE 2. The Firebombing Circuit



10. Airspace Management

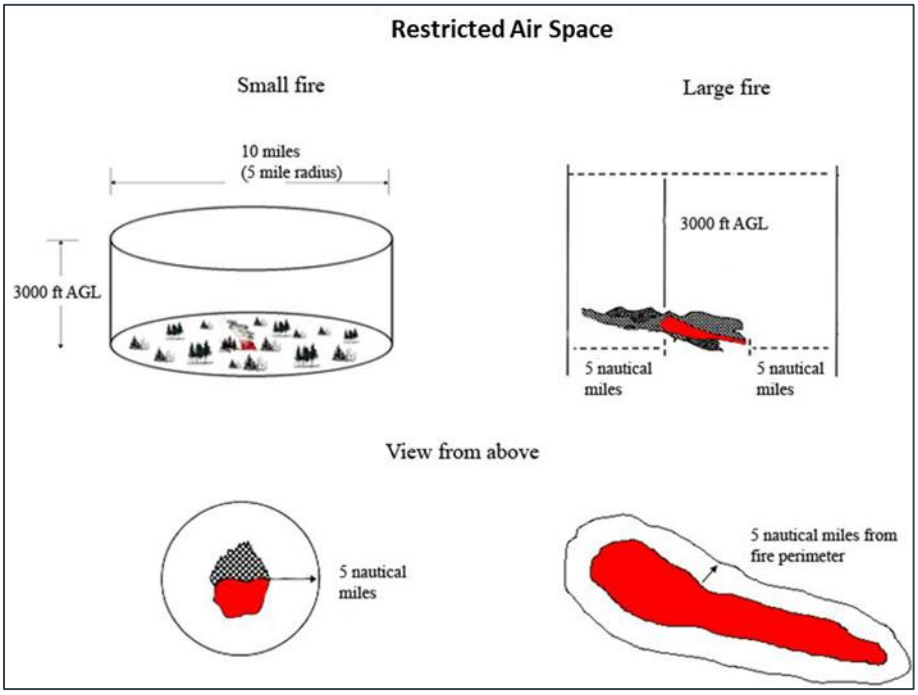
The birddog team (birddog pilot and Air Attack Officer) manages the airspace over an incident. Generally, the Air Attack Officer will issue airspace management instructions to helicopters on an established air advisory frequency. The birddog pilot will generally manage the airtankers using an assigned bombing frequency.

10.1. Incident Airspace Management

As per the Canadian Aviation Regulations, an automatic flight restriction exists over forest fires. The regulation reads; “no person may operate an aircraft over a forest fire area, or area that is located five (5) nautical miles around the fire perimeter and at an altitude of less than 3,000 feet AGL.” (CARs 601.15)

If additional altitude (greater than 3,000 ft. AGL) or radius (greater than 5 nautical miles) is required, a request may be made through the Provincial Aircraft Coordinator via the local Forest Area, to request a Notice to Airmen (NOTAM) issued by Nav Canada, for an amended Fire Traffic Area.

FIGURE 3. Fire Traffic Area



Aircraft assigned to the specific fire incident are exempt from the NOTAM restrictions as per CAR 601.17. This does not eliminate the requirement to request clearance into the FTA from an established airspace manager. Any aircraft working for Alberta Wildfire that will transit near a wildfire to which that aircraft is not assigned, must abide by CAR 601.15/16 listed above.

10.2. Air Advisory Frequencies – VHF-AM

Alberta Wildfire has been assigned a number of VHF-AM frequencies by Innovation, Science and Economic Development Canada (ISED). The air attack program has been given exclusive use of a number of these frequencies, which have been assigned to airtanker groups (bombing frequencies). Five additional frequencies have been allocated to be used for air advisory channels.

The following radio frequencies are to be used for air advisory:

- 129.800 MHz Primary Initial Attack
- 128.950 MHz Secondary Initial Attack
- 130.750 MHz Alternate Initial Attack (North of 53°, below 3500' AGL only)
- 130.175 MHz North Primary Sustained Action (North of 53°, below 3,500 AGL only)
- 122.650 MHz South Primary Sustained Action (South of 53°)

Consult the *FP183 Radio Guide* for a full list of available radio frequencies

10.3. General Airtanker Group Airspace Communication Procedures

Birddog aircraft proceeding to an incident will monitor the assigned VHF-AM air advisory radio frequency and the designated Firenet FM frequency. As described in Section 8.6, no aircraft will enter the Fire Traffic Area until communication with the aircraft over the incident has been established, and if an airspace manager is present, has received clearance, assigned altitude, and altimeter setting.

Airtankers should check in with their assigned birddog when able and monitor the bomb frequency. The airtanker should wait for a break in the radio communications when checking in with their birddog, if the radio communications are too busy they should only call inbound at 5 minutes. No clearance or instructions shall be given until the 5 minute call from the airtanker.

All inbound airtanker(s) will call their assigned birddog on their bombing frequency when 5 minutes back from their dispatch coordinates to request clearance and instructions (altimeter setting, altitude, position in stack). Inbound airtanker(s) must include the following when they have established communications with their assigned birddog:

- Tail number
- Frequency
- ETE
- Direction of Approach
- Fire Number
- Altitude

Example: "Birddog 126, this is Tanker 485 on bomb, I am 5 minutes back from the north of LWF 110 at 8500 feet"

If the airtanker(s) are unable to establish communications with their assigned birddog, they must remain outside the restricted Fire Traffic Area (5 nautical miles) and call the PAC on the satellite phone. The

PAC will confirm the assigned bomb frequency and working birddog with the airtanker(s). The airtanker(s) must not proceed inbound until positive communications have been established.

10.4. Single Airtanker Group Airspace Communication Procedures

Airtankers will remain on their assigned firebombing frequency and their only contact will be their birddog. The airtanker(s) will be directed to a rendezvous point (usually overhead the target) and maintain a holding pattern until instructed otherwise by the birddog aircraft. Airtanker pilots are encouraged to monitor the air advisory frequency, as an increased awareness measure. See Section 11 for more details on stacking procedures.

10.5. Multiple Airtanker Group Airspace Management Procedures

If multiple airtanker groups are working on an incident, they may either work together or independently of each other. If they work independently, the groups will typically operate over separate parts of the fire, using defined geographical boundaries.

If the airtanker groups are working together on an incident, the earliest arriving birddog generally assumes the position of the working birddog and the later arriving birddog assumes the supporting role. If additional birddog aircraft are not required on the incident, they will be instructed to return to the closest airtanker base to await further assignment. All inbound airtanker(s) will call the working birddog 5 minutes back on their bombing frequency for clearance and instructions (altimeter setting, altitude, and position in stack). See Section 11 for more details on stacking procedures and Section 15 for more details on multiple airtanker group operations.

The support birddog may be requested to assume the role of Air Tactical Group Supervisor (ATGS). The working birddog team makes the decision to establish an ATGS platform. The call sign of the supporting birddog changes to “Air Attack” and wildfire number. For example: the ATGS call sign for LWF-110 would be “Air Attack 110”. The air advisory frequency for the incident will be used as the initial contact channel for all incoming aircraft. Each airtanker will call the ATGS 5 minutes back and state the cardinal direction they are approaching from and will not enter the Fire Traffic Area until instructions have been received from the ATGS. Immediately after receiving instructions from the ATGS, the incoming airtanker will switch to the working birddog bombing frequency to monitor the airtanker bombing action and will continue monitoring (if able) the air advisory frequency. See Section 11 for more details on stacking procedures and Section 15.2 for working with ATGS.

10.6. Establishment of an Altimeter Setting

To ensure vertical separation, it is critical that all aircraft use the same altimeter setting when operating within a Fire Traffic Area. Vertical separation between aircraft within the FTA is as little as 500 feet.

- All aircraft are responsible for ensuring that a current altimeter setting is used (as per CARs 602.35)
- Altimeter settings are considered current up to 90 minutes
- Pilots will set their altimeters on the ground where the specific elevation is known (airport, tower site, base camp, etc.), but may update the altimeter enroute to obtain a more accurate setting
- If an altimeter setting is changed enroute or while working on a wildfire, it is imperative that all aircraft over the fire receive and acknowledge the new setting.
- When arriving at a sustained action incident with an Incident Management Team (IMT), the birddog team will request the altimeter for that incident and recommend updating when required.

If the birddog team updates the altimeter, they must pass the new altimeter setting to the incident dispatch so that all aircraft on the incident can be notified.

- The Standard Pressure Region altimeter setting may not be used as a default on a wildfire incident.

10.7. Flight Priorities

Airspace flight priorities over a wildfire is determined during the planning stage. Flight priorities over a wildfire are:

1. Human emergencies
2. Airtanker action
3. Helicopters (bucketing / aerial ignition)
4. Service / Logistics
5. Reconnaissance

10.8. Assigned Altitudes within the Fire Traffic Area

The altitude assignments listed below are used as a guideline by airspace managers. As wildfire situations can vary based on topography, location, class of airspace, etc., the airspace manager may be required to assign different altitudes and corridors other than these standards:

Designated Altitudes in the Fire Traffic Area

Aircraft Type	Height (Feet) Above Ground Level (AGL)
Helicopters	Surface – 500 AGL
Birddog	100 - 1,000 AGL
Airtankers in Stack	1,500 AGL and above in 500’ increments
Air Attack Platform	Next available altitude above highest airtanker in stack
Others (assessment, media aircraft, etc.)	Highest

Convert these elevations to above sea level (ASL) from above ground level (AGL) as all altitude assignments are given in feet ASL.

10.9. Integrated Helicopter Coordinator (HLCO) Operations

During HLCO operations, the HLCO manages the airspace. When a fixed wing birddog arrives, the birddog team will take over airspace management after a turnover briefing with the HLCO. If it is deemed suitable, the HLCO will be cleared to continue helicopter operations within specific airspace assigned by the birddog. If any helicopter needs to transit anywhere outside of its specifically assigned airspace, clearance must be received from the birddog.
After discussion with the HLCO, the birddog may give tactical direction to specific helicopters and integrate them with fixed wing airtanker operations.

10.10. Managing Helicopters within the Fire Traffic Area

The birddog team is responsible for managing aircraft within the Fire Traffic Area. They can use the following tactics to manage helicopters:

- Assign the helicopter an operational portion of the fire to work (e.g. bucketing)
- Assign the helicopter a safe altitude to orbit and observe
- Request the helicopter to land
- Request the helicopter to remain at a safe distance away until cleared into the fire

Helicopters should be accommodated whenever possible; however, the birddog team must not exceed their span of control. Managing more than four helicopters while operating airtankers in the same airspace can be hazardous. The birddog team must maintain complete situational awareness of all aircraft (airtankers and helicopters) within their airspace, and ensure that vertical and horizontal separation is maintained at all times.

If at any time, either member of the birddog team feels that they are losing situational awareness, they must reduce the number of resources that they are managing within the airspace (e.g. hold airtankers outside the Fire Traffic Area or at an airtanker base, request helicopters land or hold outside the Fire Traffic Area).

Note: Helicopters with external loads shall not be stacked above other aircraft.

10.11. Loss of Communications

If an airtanker experiences total or partial loss of air-to-air communications during operations, the following procedures shall be used:

Note: At no time will these procedures take precedence over safe operation of the flight, especially with regards to traffic and terrain collision avoidance.

10.11.1. Before Entering the Fire Traffic Area

The airtanker must not enter the Fire Traffic Area and attempt to contact birddog by text or satellite phone and advise. If unable to establish communications with the birddog, contact the PAC by either text or satellite phone and advise. Return to airport of origin or other suitable airport using normal loss of communication procedures.

10.11.2. After Receiving Clearance into the Fire Traffic Area, Prior to Entering the Stack

Maintain assigned altitude and reverse course and leave the Fire Traffic Area. Do not change altitude unless safety demands it until clear of the Fire Traffic Area. Attempt to contact birddog by text or satellite phone and advise. If unable to establish communications with the birddog, contact the PAC by either text or satellite phone and advise. Return to airport of origin or other suitable airport using normal loss of communication procedures.

10.11.3. After the Overhead Call and/or Established in the Stack Before Becoming Working Tanker (not number 1 tanker)

Maintain assigned altitude. Attempt to contact birddog by text or satellite phone and advise. If unable to establish communications with the birddog, contact the PAC by either text or satellite phone and advise. Maintain the assigned altitude and leave the stack in the direction of the origin. Do not change altitude unless safety demands it until clear of the restricted area. Return to airport of origin or other suitable airport using normal loss of communication procedures.

10.11.4. Once the Working Tanker (number 1) and at Any Time During the Run

Maintain assigned altitude. If descending for the run, stop descending but continue with the run as flown by the birddog. Do not drop the load unless safety of the flight requires it. Return to the bottom of the stack. Attempt to contact birddog by text or satellite phone and advise. If unable to establish communications with the birddog, contact the PAC by either text or satellite phone and advise. Do one orbit then leave the stack in the direction of the origin. Climb when appropriate as if a normal exit. Once clear of the fire area, return to airport of origin or other suitable airport using normal loss of communication procedures.

10.11.5. After Receiving Exit Instructions

Continue with exit as per normal. Attempt to contact birddog by text or satellite phone and advise. If unable to establish communications with the birddog, contact the PAC by either text or satellite phone and advise. Climb when appropriate as if a normal exit. Once clear of the fire area, return to airport of origin or other suitable airport using normal loss of communication procedures.

10.11.6. Skimmer Aircraft

Maintain the position within the group until over the scooping area. Then leave the group in a manner consistent with good airmanship and safety. Attempt to contact birddog by text or satellite phone and advise. If unable to establish communications with the birddog, contact the PAC by either text or satellite phone and advise. Climb when appropriate as if a normal exit. Return to airport of origin or other suitable airport using normal loss of communication procedures.

11. Stacking Procedures for Retardant Airtankers

As discussed in Section 10.7, a system of assigned altitudes for various aircraft arriving to an incident has been developed. Within this system, a series of altitude assignments is reserved for orbiting airtankers. Procedures have been developed to safely and efficiently manage land-based (retardant carrying) airtankers over the fire.

Skimmer Airtanker procedures will be covered in Section 14, as they typically do not orbit overhead the fire location.

11.1. Aircraft Separation – Birddog and the Working Airtanker

The working airtanker shall not occupy the birddog's airspace (up to 1000 feet above target elevation) until positively cleared into that airspace. A phrase including the working airtanker's three-digit tail number and the words "cleared the run" will signify that the birddog team is permitting that airtanker to share the common airspace and that all ground crews or personnel are in safe locations relative to the intended drop zone. Once the "cleared the run" command has been issued, and with positive visual contact with the birddog aircraft, the airtanker may descend into the circuit.
Generally, the birddog maintains right-hand orbits to allow the AAO the best view of the fire, but may switch to a left-hand circuit while demonstrating the run if a following airtanker intends to fly a left-hand circuit. Airtankers observe from the stack in a left-hand orbit, and generally prefer a left-hand circuit (terrain permitting) bombing run. Following the drop, airtankers will exit the run as briefed by the birddog team. After the airtanker has completed the bombing run, the airtanker will either:

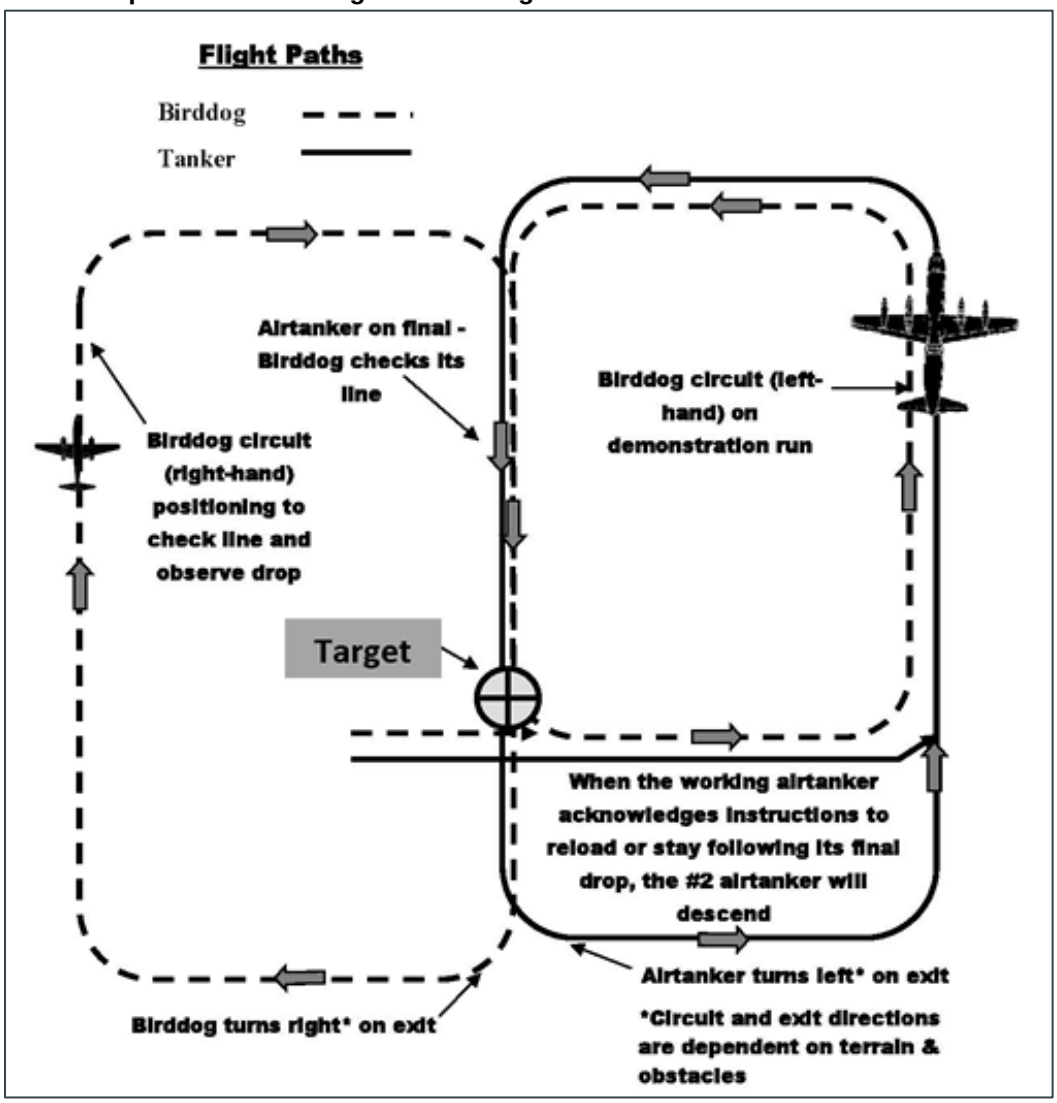
- Climb to the base of the stack, if the airtanker has retardant remaining, and wait for instructions for the next run, or
- Exit the Fire Traffic Area as instructed by the birddog team.

The two aircraft occupying the airspace within 1000' above the ground must maintain visual separation. In the event visual contact is lost, each aircraft must fly standard predetermined flight paths until visual contact is regained.

Should terrain or aircrew preference require use of a non-standard circuit, the procedure to provide lateral separation must be briefed and updated as necessary.

The need to keep the bombing frequency free of superfluous traffic and the use of clear and concise transmissions is essential when two aircraft are operating in the same airspace. The silence on this frequency is not wasted, but serves as a valuable buffer available to all aircraft to avoid confusion and reduce the possibility of a conflict.

FIGURE 4. Aircraft Separation – Birddog and Working Airtanker



11.2. Stacking Procedures

The base of the stack is established by the working birddog. In general, the base of the stack will be set at 1500 feet above ground level (rounded up to the nearest 500-foot interval). Only the working birddog controls the base of the stack.
All inbound airtankers must contact the working birddog aircraft 5 minutes back from the Fire Traffic Area. At this time the birddog team will pass the following information:

Mandatory Points:

1. Altimeter setting
2. Entry altitude into the stack
3. Position in the stack
4. Identity and/or type of the preceding airtanker

Time Permitting:

5. Target Altitude
6. Brief fire summary and objective
7. Orientation and direction of run
8. Any applicable flight safety hazards or traffic conflicts

After the information is received, the airtanker pilot will read back the first four pieces of information confirming to the birddog team it was received correctly.

Example: “2978, 5,000 feet, number 2, following 487”

Upon entering the stack, the airtanker pilot will:

- Announce arrival and altitude and position in the stack e.g. “Tanker 485 is overhead at 5,000 feet, number 2”;
- Fly a left-hand orbit
- Observe and monitor the instructions given to preceding airtankers.

Vertical separation must be maintained visually and by reference to cockpit instruments. Each pilot will keep the airtanker immediately below them in sight and shall fly consistent speeds and angles of bank to enable the following aircraft to observe them. Pilots should broadcast if they lose visual contact with the preceding aircraft below.

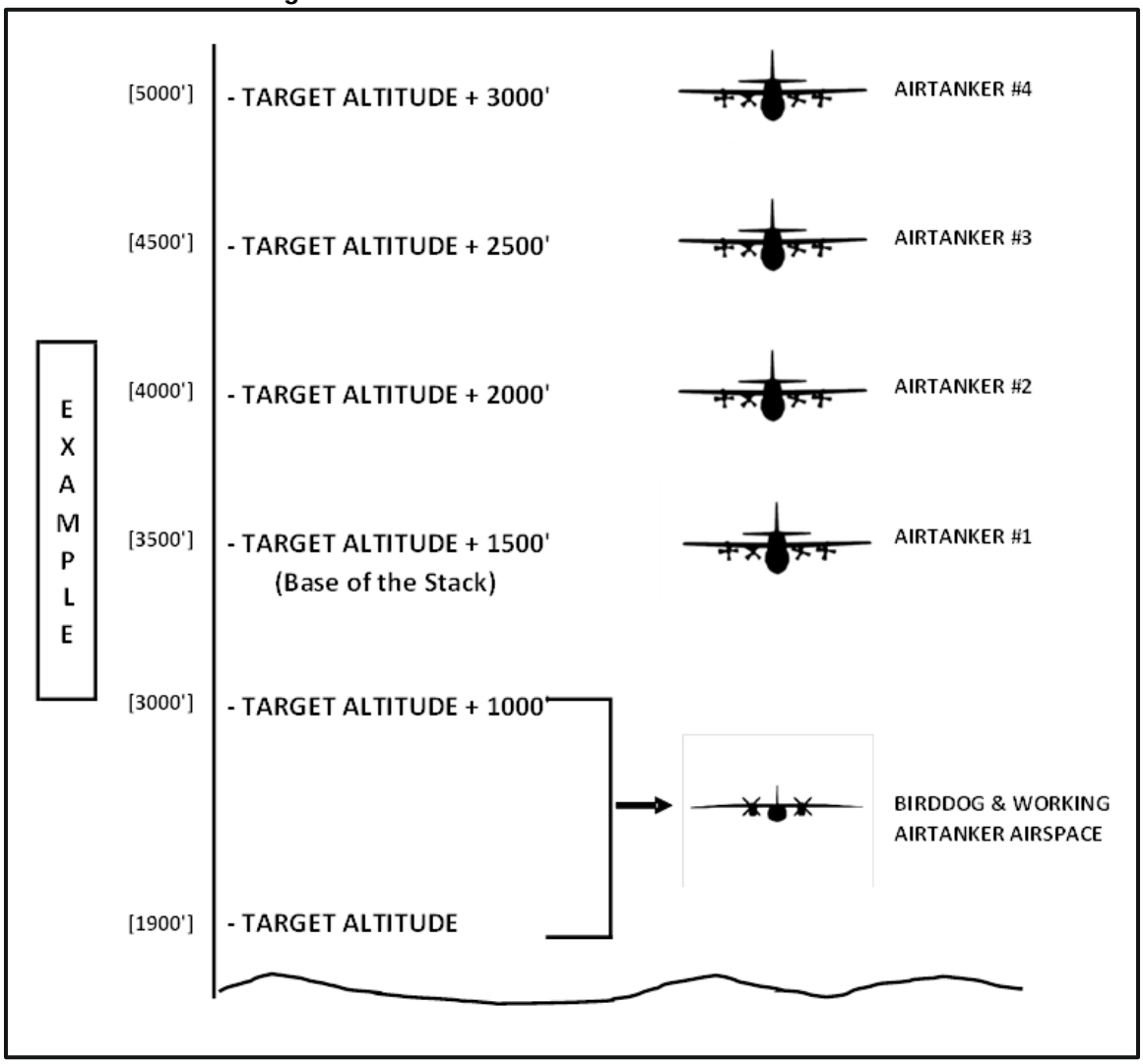
After the birddog team has issued instructions to the working airtanker (#1) to exit the airspace, airtanker #2 will automatically descend to the base-of-stack altitude and assume the working position. Airtanker #2 will simultaneously broadcast the maneuver with a statement that includes that airtanker’s tail number and a confirmation of the altitude to which it is descending.

The birddog team will acknowledge this statement. Upon hearing this acknowledgement, all other airtankers in the stack will simultaneously descend 500 feet (see note below regarding exception for line astern) to their new, lower stack position while maintaining visual reference to and separation from the aircraft below them.

Note: If a line astern procedure has just been completed, the pilots in the stack will need to calculate how much to descend based on the number of airtankers involved in the line astern. For each aircraft in the line astern formation, they will need to descend 500 ft. / aircraft. Example: three aircraft in line astern formation would require a 1500 ft. descent.

All aircraft must maintain visual reference with lower aircraft in the stack. If visual reference is lost, or confusion exists, any pilot may request a “Stack Check” will be before moving down in the stack initiating descent. When a stack-check is requested, each aircraft, starting at the base of the stack, will identify tail number and current altitude. This will continue to the top of the stack, including inbound aircraft with an assigned altitude.

FIGURE 5. Stack Configuration



11.3. Stack Deconstruction – Dispersal of Aircraft from the Fire Traffic Area

The following procedure will be used for the deconstruction of the stack and dispersal of all aircraft inside the Fire Traffic Area when a decision to cease fire action has been made:

- The working birddog team will communicate to all airtankers established in the incident's stack that no further airtanker action will occur on the incident.
- The working bird dog team will state, "All aircraft hold your position and wait for further instructions".
- The birddog team will then give exit instructions to all aircraft in a safe and organized manner.
- If an ATGS platform has been established, the ATGS team will assist the working bird dog team as needed.

Incident geographical, environmental and observed flight conditions may require, at the discretion of the working birddog team, deconstruction of the stack from the top of the stack downward or from the base of the stack upward.

11.4. Horizontal Separation (Racetrack Circuit)

While it is rare in Alberta to horizontally separate airtankers, there may be some cases where it may be beneficial to the operation. Similar forms of separation are used by other agencies, mainly in the United States.

All inbound airtankers must contact the operational birddog aircraft when 5 minutes back from the fire. At this time, the birddog will assign/confirm the altimeter, entry altitude into the airspace (usually 1500 ft. AGL rounded to the next highest 500 foot altitude), inform the pilot they will be horizontally spaced and provide the aircraft type and tail number of the other aircraft at the same altitude in the airspace.

Note – It is extremely important that pilots maintain visual separation with one another upon entering the airspace and over the target area until called down for a drop. It is important that visibility be good, that the flight patterns be adequate and not hindered by terrain and that no-fly zones be communicated from the birddog team. Only aircraft of similar weight should be horizontally spaced together at one time. In the event of mixed sized airtankers, e.g. AT-802 following an L-188's, it would fall to pilot's discretion and a 'caution wake turbulence' advisory should be issued. If other aircraft of different size are not comfortable then establish a hold area for them until the current aircraft are cleared from the racetrack.

When established at the assigned altitude, and considering the need to maintain visual reference/separation with other airtankers, the airtanker pilot will:

- announce arrival and altitude ("Tanker 681 is overhead at ____ feet, following Tanker 682")
- assume a left hand orbit unless directed otherwise
- report the loss of visual contact of the airtanker immediately ahead of them and widen their circuit until visual reference is regained
- observe the action and listen to the instructions given by the working birddog.

11.5. Split Stack

A method of separating airtankers into two stacks. This may be required due to operating differences between aircraft, or due to insufficient vertical space to accommodate all aircraft in a single stack (low cloud ceilings or overlying controlled airspace). A second vertical 'holding' stack may be established over a point other than directly overhead the incident. If possible, the two stacks should maintain separation referencing geographic features. The two stacks should be established so that conflict-free transition corridors exist between the fire and the reload base/skimming lake.

As airtankers are processed and given instructions after dropping, they are replaced by aircraft moving from the bottom of the 'holding/reserve stack' to the top of the 'operating stack', as directed by the birddog or ATGS.

12. Target Identification Techniques

12.1. Verbal Identification

Upon arrival at the incident, the airtanker pilot will advise the birddog team when overhead with the birddog in sight. At this time, the birddog team - generally the birddog pilot - will provide the airtanker pilot with a more detailed description of the proposed target and run. Information provided may include:

- Target altitude
- Direction of run
- Direction of approach (left or right-hand)
- Placement of drop
- Correction for wind drift
- Type of drop
- Hazards
- Exit

Following confirmation that the airtanker is in position to observe the run, the birddog team will use one of the following techniques to pinpoint the target:

12.2. The Demonstration Run

The demonstration run (also referred to as the "dummy run" or "show me") is a simulated bombing run made by the birddog to demonstrate the run and identify the target to the airtanker pilots. Loaded airtankers have limited maneuvering and climbing capabilities. These low-level passes must simulate the flight of the airtanker, in a manner that will allow the airtanker to hold the load over the fire and exit safely.

The birddog team will confirm that the airtanker is in position to observe, and the birddog team - usually the birddog pilot - will describe the following:

- The circuit
    - announcing each new leg
    - Hazards as they are encountered
    - giving clear references, if available and
    - headings.
- Ridge crossing altitudes
- Reference point(s) to assist the airtanker pilot in determining the proper line
- Target altitude
- Exit

The birddog pilot will announce visual contact with the target and when the birddog is overhead will identify the target by announcing “Start Now”, or “Start Here, Stop Here”. It is imperative that the birddog flies beyond the anticipated load length on the ground before initiating the exit route to ensure that the airtanker could hold the load and still exit safely.

When approaching the target, the AAO will activate the electronic siren in ‘yelp’ mode as a warning of an imminent drop to ground crews. This is an AAO function; the birddog pilot focuses on flying the aircraft at this low altitude. The siren will be used on every incident and the Air Attack Officer will not commence action until ground crews have confirmed they are clear of the drop areas.

The demonstration run is normally used for the first airtanker on a specific run or when an incoming airtanker has not had the opportunity to observe the previous drop. Subsequent run descriptions may be given verbally rather than demonstrated, but only if the birddog team has previously flown and checked them for feasibility.

Once the target has been identified, the birddog pilot will place the aircraft in a position to allow the Air Attack Officer an unobstructed view of the run and the drop to permit line corrections and drop assessments as required.

When the airtanker pilot announces “final and armed”, the birddog pilot will acknowledge this transmission, and maintain radio silence unless the line being flown requires correction, or an obvious safety concern exists.

12.2.1. Demonstration Run Example

The following example (Figure 6) is meant to help put the above-noted procedures in better perspective. The numbers listed for each transmission correspond to the position of the aircraft in Figure 6.

1. Tanker 485 — "Birddog 56, Tanker 485 is coming up overhead at 3500 ft. I have you in sight. Go ahead your run"

2. Birddog 56 — "Tanker 485, Roger. Check us over the fire, crosswind left hand for the run. Arm 1/2 @ coverage level four"

3. Birddog 56 — "Downwind left"

4. Birddog 56 — "This is left base over ridge…. ridge crossing at 2300 feet"

5. Birddog 56 — "Final over the swamp, lining up with the left side of the fire and a tall grey snag…..Short final … Tag on to the snag ... Start here, target altitude 1800 feet"

6. Birddog 56 — "Exit slight left and follow the valley… Caution rising ground, right wing and the snag really pokes out above the canopy. Note, we ran into some descending air turning base to final."

7. Tanker 485 — "Tanker 485 has the run, crosswind left"

   Birddog 56 — "Tanker 485 you are cleared the run. Anticipate the same run direction tagging onto the drop you're about to make"

8. Tanker 485 — "Roger, cleared the run, 485 is downwind left hand armed 1/2 at coverage level four"

   Birddog 56 — "Roger"

9. Tanker 485 — "Final, armed"

   Birddog 56 — "Roger"

10. Birddog 56 “Tanker 485, bullseye. Tag on to the head of the last drop and extend, turn the line 10 degrees left. Arm remainder at coverage level three. The exit is left, down the valley and caution the tall snag you just tagged on to.”

8. Tanker 485 “Roger. Downwind left armed remainder at coverage level three”

Birddog 56 “Roger”

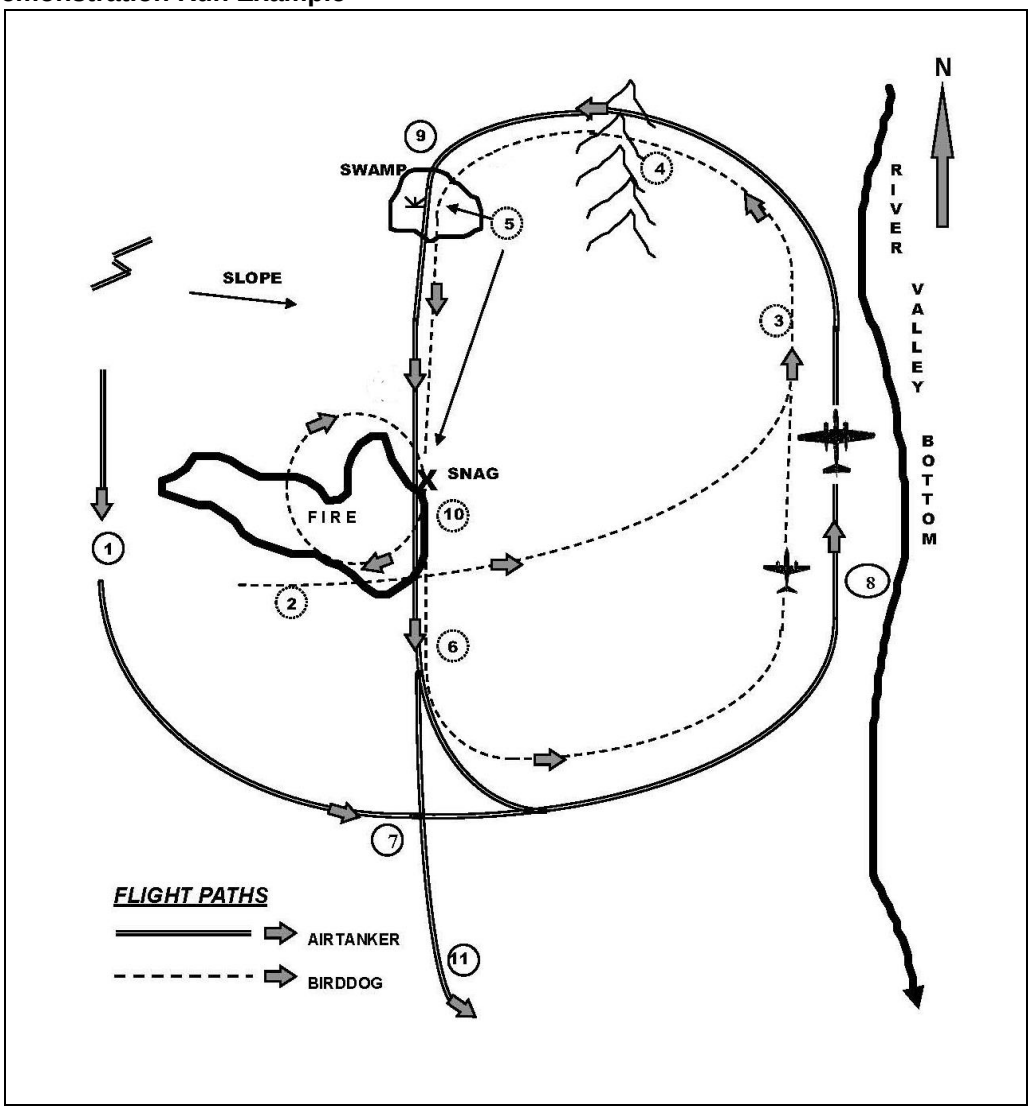
9. Tanker 485 “Final, armed”

Birddog 56 “Roger”

10. Birddog 56 “Tanker 485, one quarter short…Loon and reload”

11. Tanker 485 “Roger, Loon and reload”

FIGURE 6. Demonstration Run Example

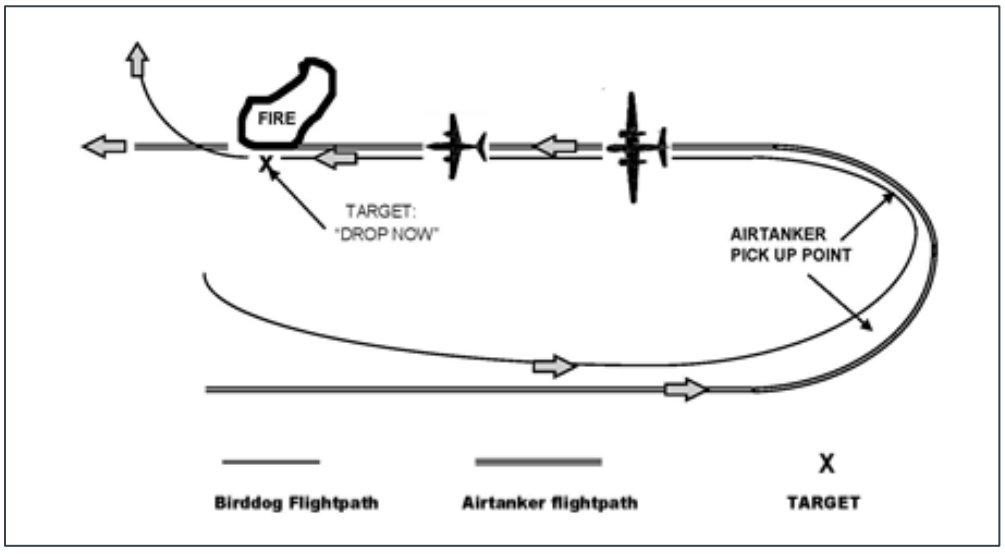


12.3. The Lead In

The lead in is normally used when the line and trigger point are difficult to see or describe due to visibility or lack of references. It is commonly used with skimmers. The following is the sequence used for the lead in:

- The birddog pilot maneuvers in front of the tanker on the downwind or base leg of the circuit.
- At this time, the birddog pilot will give a brief run description that will include any hazards and the exit.
- The airtanker will follow the birddog at a safe distance. Any airspeed adjustments required for spacing are accomplished by instructions from the airtanker pilot to the birddog pilot. On final, the birddog pilot will either count down “3, 2, 1, Now” to announce the start point or identify the target by announcing “Start Now”, or “Start Here, Stop Here” .
- The airtanker will advise that they are on final and armed for the type of drop requested.
- Following the announcement, if it’s safe to do so the birddog may pull up and make a 180^{o} turn away from the fire’s edge, to parallel the final run, while maintaining a safe distance from the airtanker. This maneuver puts the birddog in position for the Air Attack Officer and/or birddog pilot to observe the drop and make an assessment.
- After the birddog has acknowledged the airtanker is on final, radio silence will be maintained unless:
    - There is a safety concern or
    - The load needs to be held.

FIGURE 7. The Lead In

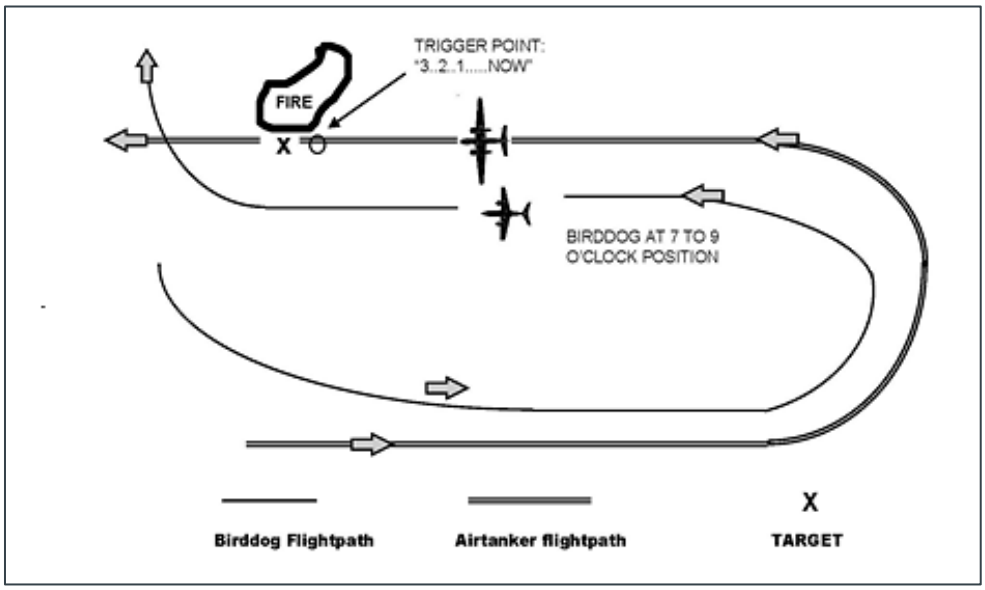


12.4. The Called Shot

This method is used when the airtanker pilot understands the required line but the actual target or trigger point is indistinct. The, birddog team will provide instructions prior to the airtanker approaching the target. For this maneuver, the birddog falls in alongside the airtanker on the final run. The birddog pilot must consider wake turbulence and the climb capabilities of the airtanker.

As the target is approached, the Air Attack Officer or birddog pilot will begin the called shot countdown “3, 2, 1, Now”. The airtanker pilot triggers the load upon hearing “Now”. The assessment is always a “bullseye” for the airtanker pilot unless there is a delay between the ‘Now’ command and release of the retardant load. Be aware of differences in altitude or lateral position between the birddog and airtanker may creating a distorted perspective for the Air Attack Officer. This parallax may cause an inaccurate release command.

FIGURE 8. The Called Shot



12.5. Line Astern Formation

Line astern formation is defined as more than one airtanker sharing the working airspace below the bottom of the stack with the birddog aircraft, following each other through the circuit to the drop and exit. Line astern may be used to expedite line-building, to rapidly clear several aircraft from the stack, or if low cloud/smoke ceilings limit the stack altitude. Each airtanker retains the option to accept or decline a line astern request. The birddog may fly a demonstration run with each airtanker pilot observing from above, or may initiate a lead-in with multiple aircraft following. The birddog team shall highlight that multiple airtankers will share the working airspace by including the term “line astern” within the run clearance: “Tankers 678, 679, cleared the run, line astern”).

Given wake turbulence considerations, line astern formations should be conducted with similar-weight aircraft only. A lighter aircraft shall not follow behind a heavier aircraft in line astern. The birddog team shall issue a “caution wake turbulence” advisory to the trailing aircraft. Line astern runs must all be flown in the same direction (tag-on, roll-up and parallel instructions only) with no more than a 10-degree

change in lines between aircraft. Aircraft spacing shall be sufficient to allow the birddog team to assess the preceding drop and adjust instructions for the next-to-drop aircraft. The next-to-drop aircraft will acknowledge instructions with their tail number. Only the last aircraft in line may return to the bottom of the stack with a partial load of retardant aboard; all preceding aircraft will attempt to empty their tanks and depart the Fire Traffic Area following their drops. All aircraft in the formation shall be issued a common exit path, and the group will not set course directly for the destination airport until clear of the bombing circuit. In the event of a go-around (retardant load is held), the airtanker will fly the exit in line astern formation as instructed and request clearance to remain in the working airspace or rejoin the top of the stack.

Line astern formations are commonly used with skimmer aircraft and multiple-aircraft groups such as the AT-802s, but are less commonly used with heavier airtanker types.

12.6. Aircraft Overrun Procedures

In the event of an imminent overrun of an aircraft by another aircraft, the aircraft in danger of overrunning the other aircraft will communicate the overrun and their deconfliction plan.

13. Retardant Airtankers - Direct and Indirect Attack

Retardant control lines should be coordinated with the ground suppression activities. If ground suppression does not follow retardant application, the fire can eventually burn through

13.1. Direct Attack

Fire retardant is dropped directly on the burning fuels to completely blanket smaller fires and to cool hot spots that are hampering the control efforts:

Spot Fires - Smaller fires are normally covered with retardant. Use caution, to ensure that the edges of the fire are well covered with no spots outside of the line (dropping a load directly on a fire can blow burning fuels outside of the fire perimeter). When dropping on a spot fire:

- Run the drop into the wind and place the forward portion of the drop on the fire, to provide the concentration of retardant on the flames.
- Blanket the fire from different angles to ensure adequate coating.
- Cover the uphill or downwind side of a small fire first.

Cooling Hot Spots - Hot spots on larger fires sometimes must be cooled with direct applications of fire retardant. When knocking down hot spots close to the fire's edge, care must be taken to avoid dropping long or short and spreading the fire by blowing it in all directions.

13.2. Indirect Attack

Fire retardant is used to build a line that will either stop the fire or will be used as a control line to burn out from. The standard procedure is to lay retardant across the head of the fire, then down each flank, and finally across the base. If the head is too smoky it can be cut off with a pincher-type of flanking attack. The sides are gradually squeezed in until the head is pinched off.

Natural and Artificial Guards - Line construction can be hastened and fire retardant saved by taking strategic advantage of natural breaks, such as lakes, streams, rockslides, etc. Take advantage of areas with light fuel loading such as meadows or rangeland. Fire retardant can be spread much thinner and farther in these locations

Fireproofing - When fire is threatening to over- run equipment, structures or escape into areas of slash, etc., fireproofing may be considered. Retardant is dropped around and not directly on buildings, equipment, or other values (i.e. farm buildings and equipment / logging machinery). Coating fuels outside of the fire control line is used where it appears the control line may be insufficient to hold the fire.

13.3. Line-building Techniques

Wildland fire principals that apply to the conventional methods of attack (e.g. hand line, dozers, etc.) also apply to fire retardant line construction. Watch for and avoid:

- Locating line through heavy accumulations of fuel
- Sharp corners
- Excessive amounts of unburned fuel within the control line
- Dropping long term fire retardant inside the fire perimeter

The following should be considered when line building:

- **Coordination** - The establishment of any fire retardant control line with the ground crew(s) requires coordination. Clear communication of the air attack plan will help avoid airtankers being held up waiting for crews to clear the drop zone. Keep approach and departures from the drop zone clear of ground crew(s). If possible, avoid low overflight of helicopters on the ground.

- **Fire Spread** - Anticipate fire spread so the line is not outflanked while waiting between drops. Grass and slash type fuels move very quickly and it is often necessary to back off from the fire's edge to allow the time lapse between loads.

- **Direction of Run** - Set up direction of line construction so that the pilots are tagging onto the existing line rather than rolling up to it. Tag-ons are easier with less chance of a miss.

- **First Load (Marker Load)** - When possible start the line at a conspicuous spot so that the pilot making the first drop will have no problem identifying the target. If it is difficult to pinpoint the starting place, a partial load may be used as a marker and reference. Follow up drops can be made in relationship to this drop (marker load).

- **Overlapping Loads** - Single door drops from conventional tanks must be overlapped 25% to ensure effective coverage. Drops from Constant Flow tanks need to overlap by 30-40 feet (9-12m) to ensure effective coverage.

- **Heavy Fuels** - In heavy fuels loads you may have to "double up" on retardant drops in order for the retardant to penetrate to the ground, even if using higher coverage levels. It may also be necessary to perform retardant drops in both directions to cover as much of the fuel as possible. (I.e. "shadowing effect" of large diameter fuel in the direction of the drop).

- **Turning Corners** - Avoid sharp corners, as the fire retardant line width will be narrow and the area will be difficult to protect. Round out the corners by using extra retardant.

- **Mountain Fires** - Fires on slopes naturally burn uphill during the daytime, and can spread downhill due to subsiding air and/or slope cooling in the evenings and night. Burning fuels can also roll downhill. Normally the initial run is made across slope to cut off the spread and the flanks are followed up with downhill or side stepping runs. It is advisable to remind ground crews to be especially aware of materials rolling down hill in these instances and the retardant may dislodge material in the hillside

- **Steep Runs** - Consider the following procedures when dropping on steep slopes:
    - Cooling off the head and then the up valley flanks will result in a flow of air into the fire at these points, negating the effects of the natural up slope and up valley winds.
    - Fly with the contours rather than at right angles to the fire edge, to ensure enough retardant reaches the ground. This parallel or "side stepping" technique necessitates additional drops, however, if the downhill runs are not feasible or are ineffective, then there is no alternative.
    - Make runs towards the fire edge to avoid blowing burning fuels outside of the line.

- **Half On - Half Off** - The theory of this drop type is to simultaneously cool and guard the fire. This type of drop requires a high degree of accuracy from the airtanker pilot and the slightest miscalculation could result in most of the load falling inside the fire and be wasted. Use caution if attempting the half on- half off drop

- **Flanking Action** - <u>Fast spread rates and high intensity fires:</u>
    - Hold flanks to prevent expansion until the head slows down or runs into a natural barrier.
    - Tie into an anchor point on the rear or a portion of the flank and work the line towards the head

  <u>Slower spread rates and moderate to high intensity:</u>
    - Angle loads (pinching) across the head to reduce it to a manageable size, followed by progressing across the head

- **Outflanking** - Outflanking may occur when hot spotting a long length of fire perimeter. Consider making a continuous line with overlapping loads. A multi group operation may be required to meet the fire retardant demand. If a suitable water source for skimmer airtankers is nearby, a long term / short-term combination can be considered.

14. Skimmer Operations

Many of the land based airtanker procedures and principles apply to the water skimmer / scooper airtanker operations. There are notable differences in the attack principals and mission operations. Skimmers operate on the litres per hour concept, by delivering large volumes of short term suppressants in as short a time period as possible. Water drops can normally be expected to reduce fire intensity and rate of spread for a short period of time (foams or other additives increase the length of effective time), depending on forest fuels and current burning conditions. It is essential that the water source be located relatively close to the fire with a minimal difference in elevation, and that ground crews are on site during or shortly after the action.

The Air Tractor 802 Amphibious, and Canadair CL215T can operate as both a land based retardant airtanker and skimmer airtankers. Upon dispatch, or when requesting these aircraft on a fire, the AAO can decide whether to have retardant loaded into the aircraft or have them fly directly to the closest skimmable lake to commence skimmer operations. Upon arrival at the fire with a load of retardant, the aircraft will operate as a land based retardant airtanker for the first drop. The AAO then has the option to request the airtanker for additional retardant loads as required. Following the retardant drop(s), if a skimmable lake is within an effective turn around distance, the aircraft can commence skimmer operations.

Note: While the CL215T is capable of carrying long term retardant, due to its poor drop footprint, smaller load capacity, and reduced efficiency, this practice should only be considered when:

- Water sources are frozen or inoperable,
- There is a shortage of land based retardant airtankers, or
- The turnaround time to a water source is inefficient to meet the needs at the fire.

The majority of air attack operations when using skimmers are done using direct attack. Effective delivery is determined by the distance of the skimming circuit from the fire and the conditions at the fire

Topography must be considered in mountainous areas as the turnaround times can be lengthened by density altitude and skimming route diversions over or around hills. It is essential that the water sources are located relatively close to the fire, with a minimal difference in elevation

Due to the very nature of the “Litres per Hour” concept, drop/run delays for skimmer aircraft must be kept to a minimum otherwise the cost effectiveness of the operation may become questionable. Fires of moderate intensity can be controlled from 15-mile distances. Upper levels of moderate and lower levels of high intensity [approx. 1,500 to 2,500 KW/m] require 5 to10 mile distances, to be effective. Additional skimmer aircraft must be added to the skimming circuit, or consider a multi group operation with land based airtankers if travel/ turnaround time is too long, to meet the fire control objectives. Considerations when working with skimmer aircraft is to stagger the refueling of each plane, to be able to keep airtankers on the fire

The following table illustrates the number of drops per hour, drops per fuel cycle, and volume per hour that one CL-215T and one AT802 amphibious aircraft can deliver at various distances from the skim lake. This table was calculated using ideal conditions at the water source with a direct route to the fire.

FIGURE 9. Skimmer Performance at Various Distances

CL-215T				
Skim Distance (NM)	5	10	15	20
Time Between Drops (min)	7	10	12.3	16.3
Delivery (l/hr)	10,285	7,200	5,853	4,417
Drops/hr	9	6	5	3
Drops/Fuel Cycle	36	24	19	14
AT802-AF				
Skim Distance (NM)	5	10	15	20
Time Between Drops (min)	6	11.5	15.3	20.6
Delivery (l/hr)	5,400	2,817	2,117	1,573
Drops/hr	10	5	4	3
Drops/Fuel Cycle	40	20	16	12

14.1. Skimmer Airtanker Operations

The birddog team in consultation with the airtanker pilots, will determine the nearest potential water source for skimming. Consideration must be given to the following points:

- Distance/ time to the water source from the fire
- Difference in elevation inside the skimming circuit [if applicable]
- Depth of water body
- Water conditions [i.e. brackish water] and obstructions on the water surface
- Available and useable length of water surface for skimming. Approximately one mile water surface and six feet of water depth is needed for skimming a load
- Suitability of approach and departure paths at the water source. Consider winds and hazards
- The final decision as to the suitability of a water body for skimming is at the discretion of the airtanker crew

Note: If the skimmer airtanker pilots plan to change water sources for any reason, they must request clearance before deviating from the established water source.

The skimmer crew will establish a bombing circuit similar to that illustrated in *Figure 10*. Aircraft separation is normally horizontal rather than vertical. The skimmer crews will establish themselves in the circuit and maintain their own separation. Water skimmers do not normally orbit over the fire, as a rule, the skimmer airtanker will fly a straight-in approach and are dependent upon the assessment runs made by the birddog.

For initial drops in a given area of the fire, the “lead-in” technique is preferable to other methods of target identification. The birddog then orbits and directs the attack by assessing drops and referring to previous drops/assessments for subsequent load placement. The next-to-drop airtanker will acknowledge instructions with their tail number. Every new run, or change in run direction must be flown and assessed by a birddog prior to establishing orbit and direct tactics.

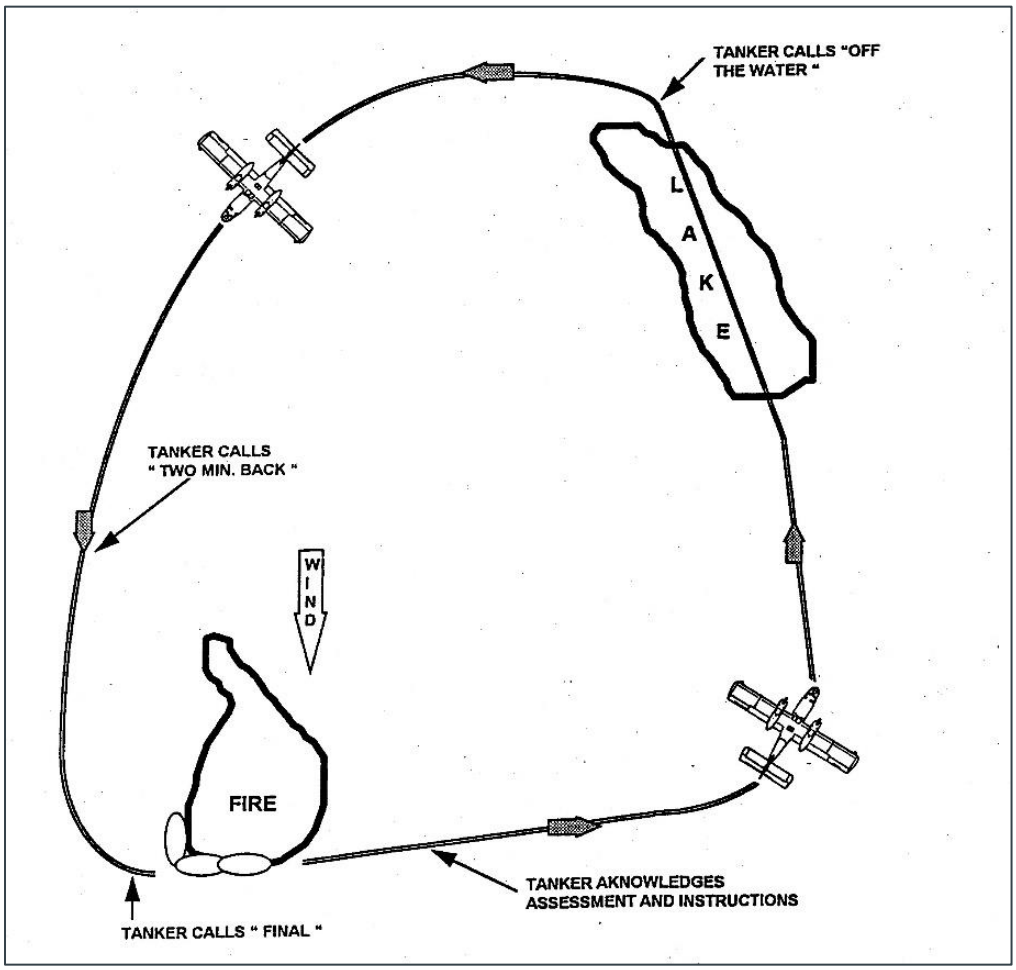
During skimming operations, the skimmer crew will advise the birddog team “off the water with a load”. The, birddog team understands by this statement that skimming was safely completed and are ready to be incorporated into attack plan. If the skimmers airtankers are required to hold (i.e. for other traffic) they will be instructed to orbit over their pick-up water source or at a holding area designated by the birddog team. Due to a heavy cockpit workload during the water pickup, do not attempt to contact skimmer aircraft while on the water, unless an emergency exists.

Land-based and amphibious airtankers may work the same fire simultaneously. Given the fire size and other logistics (i.e. location of water source from the fire), it may be possible for two birddog teams to work multiple groups independently if the fire can be split geographically. When groups are combined under one birddog, the working birddog will direct both land-based and skimmer airtankers. A second birddog aircraft may be assigned to an ATGS role, or released from the fire to return to the closest airtanker base. The fire conditions, location of the water source and airtanker base from the fire and the fire priorities are used to determine the need between long-term and suppressant drops.

Skimmer airtankers are required to rinse their tanks after dropping foam. It is common practice for these airtankers to rinse their tanks and drop the water loads on the fire prior to returning to base. Avoid dropping water on top of foam loads already on the ground.

Due to the nose gear configuration on the CL-215 airtanker, these aircraft do not land or take off from gravel airstrips, and do not land with a load of retardant as the stresses can damage the landing gear.

FIGURE 10. Skimmer Circuit



14.2. Integration of Land-Based and Skimmer Aircraft

A coordinated attack using land based and skimmer aircraft simultaneously can be extremely effective for fire suppression. To successfully integrate both airtanker types, it is necessary to first estimate the turnaround time for the skimmer aircraft, and then, using the interval where the skimmers are outside the fire zone scooping another load, lay the retardant lines as per normal operations.

The skimmers, upon leaving the lake will call the birddog with an ETA to the fire zone in order to provide the AAO enough time to complete a retardant run (or series of runs) and have the airtanker safely exit. It should then be clear for the skimmers to come into the zone, release their loads where the AAO directs, and return to the lake. For instances where there is a short turnaround time for the skimmers, the birddog can do the demonstration run for a retardant tanker but have the retardant tanker hold at the base of the stack and advise them that they will follow the skimmers. The skimmers can be cleared in and allowed through, and then clearance can be given to the retardant tanker. In cases where the next retardant load must go in without any delay, the AAO can instruct the skimmer group to delay their entry into the zone by extending their downwind, turning a 360, orbiting over a hold point, etc., while the next retardant load is put in.
"See and be seen" is important in an operation of this type because the retardant carriers are normally descending from a vertical stacking arrangement while the skimmers are using the bottom 500-1000 feet of the airspace above target and coming in from the side rather than from above. Confirming visual

contact between skimmers and retardant carriers is the most important factor in maintaining control of the process and keeping aircrews satisfied with the overall safety of the operation.

The primary advantage of utilizing both suppression concepts, is that the weaknesses of each can be offset by the strength the other. One of the main limiting factors to success with retardant line building is the possibility of spot fires creating new fires ahead of the already constructed line. Skimmers can be invaluable in assisting the operation, as they can be used to control these spot fires as they appear, thus allowing retardant line building to continue.

15. Multiple Group Airtanker Operations

It is common practice for multiple groups to be dispatched or an airtanker group to be dispatched in support of another group's mission. The following points outline the information and communication flow and procedures:

15.1. Enroute

The earliest arriving birddog generally assumes the position of the working birddog and the later arriving birddog assuming the supporting role. This may differ if prior arrangements have been made between responding AirAttack Officers (for example, for training or check ride purposes).

For the supporting airtanker group, when all airtankers have reported they are on the group bombing frequency, in addition to the standard update information, the AAO will confirm the working birddog call sign, bombing frequency and altimeter setting in use over the target (if available at this time).

Prior to the ‘5 minutes back’ call, the support Air Attack Officer should be in contact with the working birddog and will provide the incoming airtanker group with the following information:

- Fire Number
- Altimeter Setting in Use
- Target Altitude
- Confirmation of reload airtanker base
- Status of the support birddog (e.g., assuming the role of ‘Air Attack’, providing other support, or flying to an assignment elsewhere)
- Working birddog call sign and/or the initial contact frequency for any Air Attack already established at this incident.
- Other pertinent information (hazards, other air traffic etc.).

The support Air Attack Officer will instruct the airtanker group to switch and report on the new bombing frequency. The airtankers shall not cease monitoring their original bombing frequency unless specifically approved by their birddog team in case of an enroute diversion to a higher priority target. Superfluous radio transmissions may interfere with firebombing traffic between the working birddog and an airtanker in the bombing circuit or aircraft entering or maneuvering in the stack over the incident. When the hand-off to the working birddog is complete, the incoming airtankers report to the working birddog.

15.2. Support Birddog (Air Tactical Group Supervisor) Role Overhead the Incident

Prior to the support birddog arriving over the incident, the working birddog will assign an altitude above the airtanker stack. The support birddog will orbit at a high level and may serve as a communications link between the ground crews, working birddog, and the Fire Centre. This system allows the working birddog to concentrate on the fire and the working airtanker in the same airspace. The support birddog must also be prepared to manage airspace and descend to the working birddog role should the working team need to rest or refuel.

The support birddog may be requested to assume the role of Air Tactical Group Supervisor (ATGS). The decision to establish an ATGS platform is made by the working birddog team. The call sign of the supporting birddog changes to “Air Attack” and wildfire number. For example: the ATGS call sign for LWF 110 would be “Air Attack 110”. The air advisory frequency for the incident will be used as the initial contact channel for all incoming aircraft.

When the ATGS platform is activated, the ATGS shall broadcast on the air advisory channel that Air Attack (fire number) has been established. This information shall be passed to the Fire Centre for inclusion into the ATR, and communicated to all aviation resources assigned to the incident. Inbound and outbound aircraft will now contact “Air Attack (fire number)” on the assigned air advisory frequency for entry clearance and exit instructions. Both the working birddog and the ATGS will monitor the incident air advisory frequency as well as the working bomb frequency.

15.3. Incoming Aircraft

All aircraft will call the birddog a minimum of 5 minutes back on the incident air advisory frequency and will not enter the fire traffic area until instructions have been received from the ATGS.

Non-airtanker aircraft will either be turned over to the working birddog if they will be operating within their managed airspace or they will be assigned to another area of the incident.
Each airtanker will enter the stack at the assigned altitude. No incoming airtankers will enter or descend in the stack until the airtanker they are following has been identified visually as per the stacking procedures in Section 11.

Immediately after receiving instructions from the ATGS, the incoming airtanker will switch to the working birddog frequency to monitor the airtanker bombing action and will continue monitoring (if able) the air advisory frequency.

After an airtanker has completed its final drop and has exited the immediate fire zone (at an altitude below the base of the stack), the outgoing airtanker pilot will contact the ATGS to confirm departure intentions. This assists in traffic separation. After leaving the Fire Traffic Area, the airtanker may once again monitor enroute frequencies and ensure they are on the appropriate altimeter setting.
A sample flow of the conversation between the incoming airtanker and ATGS (assuming the incoming airtanker is unaware ATGS has been established).

Tanker 485 (123.22 MHz)	“Birddog 54, this is Tanker 485 on bomb, I am 5 minutes back from the north of LWF 110 at 8500 feet”
Birddog 54 (123.22 MHz)	“Tanker 485, contact Air Attack 110 on 129.8”
Tanker 485 (129.800 MHz)	“Air Attack 110, Tanker 485 on 129.8, 5 minutes back from the North of LWF 110 at 8500 feet”
Air Attack 110 (129.800 MHz)	“Tanker 485, this is Air Attack 110, altimeter 2983, cleared in at 4000 feet, number 1, you have a helicopter above you at 6,000 feet, Air Attack at 7,000 feet. Contact birddog 54 when overhead on 123.22.”
Tanker 485 (129.800 MHz)	“2983, 4.0, number 1, contact birddog 54 on 123.22”

NOTE: Airtankers should monitor both frequencies until overhead and report (on the working birddog frequency) in the stack at the assigned altitude or their new stack altitude if they have stepped down because they are aware of the working airtanker departing the fire.

Tanker 485 (123.22 MHz)	“Birddog 54, this is Tanker 485 on bomb, overhead at 4,000, number 1”
Birddog 54 (123.22 MHz)	“485, Roger”

Note: After the airtanker has dropped and received their assessment and instructions to reload or stay, the working birddog will instruct the departing airtanker to contact the ATGS for instructions on exiting the Fire Traffic Area.

Birddog 54 (123.22 MHz)	“Tanker 485, bullseye, Slave and reload. Contact Air Attack 110 on 129.8 for exit instructions”
Tanker 485 (129.800 MHz)	“Air Attack 110, this is Tanker 485 on 129.8, with direction Slave and reload.”
Air Attack 110 (129.800 MHz)	“Tanker 485, you are cleared out to the south, maintain 4,000 feet and below for 5 miles, then your discretion, caution 681 may be inbound from Slave”

16. Procedures for Working with Mutual Aid Agricultural Aircraft (Prairie Dogs)

Alberta Wildfire may be requested to assist mutual aid partners on wildfires outside of the Forest Protection Area. Our mutual aid partners may also use contracted agricultural aircraft on these fires. If airtanker resources are dispatched, the birddog will manage the airspace over the Fire Traffic Area (FTA).

An Alberta Wildfire representative must be on scene prior to using airtanker resources. The birddog will make initial contact with the Prairie Dog aircraft on VHF AM 126.7, and assign a bombing frequency (either the group bombing frequency (VHF AM) or the Prairie Dog frequency (Kinniburg FM 166.32). The Prairie Dogs will then monitor this assigned frequency.

All incoming aircraft will contact the birddog 5 minutes back before entering the FTA. They will provide their position, altitude and direction relative to the fire. The birddog will provide a current altimeter setting and entrance instructions.

Due to aircraft performance capabilities, Prairie Dogs will NOT be stacked above the fire in 500' intervals. The Prairie Dogs will be put into a separate racetrack orbit 1500' AGL above the target. The Prairie Dogs will not be put into the same stack with other airtanker types. A split stack will be required. The birddog will provide a demonstration run including target description, target altitude, hazards and exit instructions. The birddog will NOT lead in the Prairie Dogs.

17. Factors Influencing Drop Placement and Patterns

For retardant to accurately reach the intended target, the birddog team and airtanker pilots must consider a variety of factors. Variables that should be considered include:

- Drop height
- Aircraft speed
- Aircraft attitude
- Drop selection
- Canopy & fuel type
- Wind speed & direction
- Topography
- Tank & venting systems
- Retardant characteristics
- Atmospheric conditions
- Pilot release [trigger] point
- Volume & speed (flow) of retardant released
- Physical characteristic of the retardant

18. Assessing the Drop

There are two procedures used for observing drops:

- Viewing the drop from an overhead orbit.
- The birddog flying in formation with the airtanker.

18.1. Overhead Orbit

In this procedure the birddog pilot will position the aircraft directly above the target (approximately 1,000 feet AGL) as the airtanker drops, providing the Air Attack Officer with an unobstructed view. A right hand orbit is preferred. This method is commonly used with skimmer airtanker[s] that are bombing on a target after having received previous demonstration runs or lead-ins.

18.2. Flying in Formation

The birddog pilot will typically position the aircraft behind and to the left (7 o'clock position relative to) of the airtanker. The birddog pilot must consider wake turbulence produced by the airtanker when maneuvering into position. A proper formation is important in that it will allow the AAO the opportunity to check the airtanker for the correct line, airspeed and height above treetop or ground, and allow for observation of the drop itself. The birddog may turn right after the drop, to keep the retardant in sight until it has settled. Alternate positioning may be used due to terrain, smoke, or AAO request.

18.3. After the Drop

The AAO will observe the airtanker after the drop to ensure that it clears the area. The AAO will immediately advise the airtanker pilot if something out of the ordinary is noticed such as the load not being released, the doors not closing, an incorrect drop type or retardant streaming from the tank. The FLIR camera allows the Air Attack Officer to see the exact placement of the drop in obscured visibility. If the birddog is unable to observe where the drop settled, the footprint can be observed on a subsequent pass over the target area using the FLIR camera.

18.4. Drop Assessment

As soon as possible after the drop, the Air Attack Officer will provide the airtanker pilot with an assessment of the accuracy of the drop. If the drop landed exactly as intended, the assessment is a "Bullseye". If the drop was off-target, give the airtanker pilot an accurate description of where the drop settled in, relative to where it was intended to be dropped. Examples of items to assess and provide feedback on:

- Advise if it was long or short, relative to the load length, measured in ¼ load length increments (e.g. ½ Long)
- Left or right, relative to load width, measured in ½ load width increments (e.g. ½ Load Right, 1 left)
- Too high, low, fast, slow, or the run was flown offset from the intended line.
- Incorrect volume or coverage level selection
- Foam concentration appears weak or heavy

After the assessment, instruct the airtanker pilot to continue with the next drop or proceed to a designated base to reload or stay. If additional drops are required and the last drop was inaccurate, the birddog team will provide instructions to help adjust the trigger point or line. For example, if the instructions were to tag onto the existing retardant line and the assessment for the drop was “1/4 long and one load right”, the birddog’s next instructions would be: “Same run, parallel left starting ¼ earlier”.

The Air Attack Officer should keep track of drop times, load placement & accuracy and record on the Air Drop Form. This information should be used for debriefings, future reference and data entry into the FIRES Program.

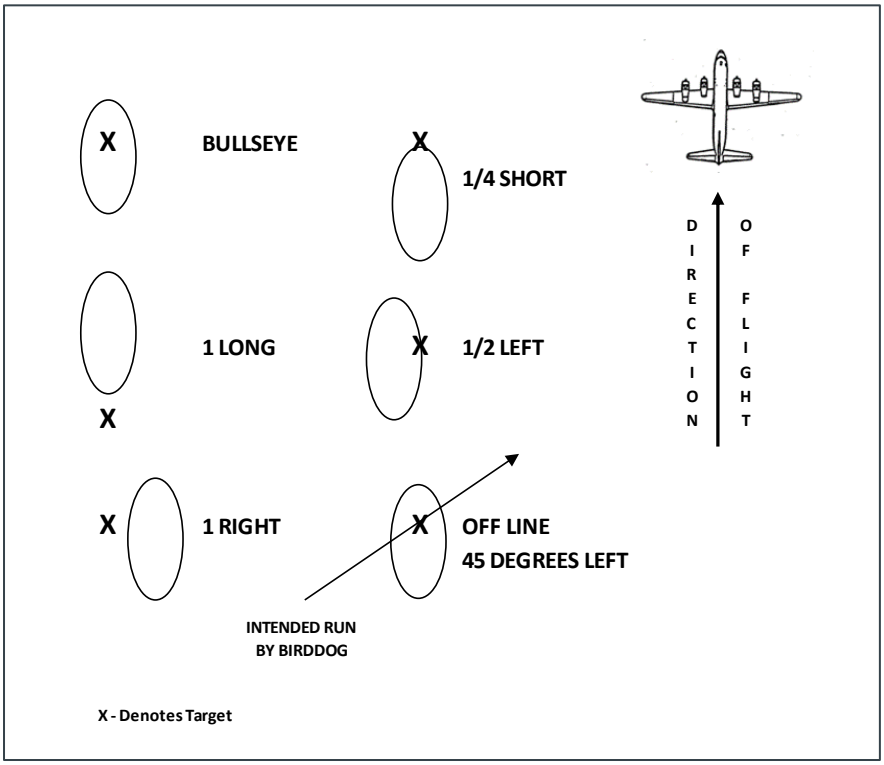
18.4.1. Drop Height

The AAO will assess the airtanker for drop height. The drop height above the canopy or bare ground must allow the retardant to lose forward movement prior to entering the canopy or hitting the ground. This height may vary from approximately 100 to 150 feet above the canopy or bare ground. When retardant loses forward movement and rains vertically on the fuel, it provides more effective fuel coverage. Low drop heights expose both the airtanker pilot and ground crews to unnecessary risk and ultimately result in a less-effective drop pattern and fuel coverage.

18.4.2. Drop Speed

The AAO will assess the airtanker for drop airspeed. The airtanker must maintain consistent drop speeds according to aircraft and company operations manuals. Drop speeds will vary according to aircraft type, tank configuration and company operations manual specifications. Low drop speeds may affect safety and maneuverability and result in excessive concentrations on the ground and less effective line length. Excessive airspeeds produce a longer, less concentrated pattern and may result in inadequate fuel coverage.

Figure 11. Drop Assessments



19. Reloading Airtankers

Air Attack Officers need to continually assess whether additional resources are required and shall:

- Request the departing airtanker(s) to reload and/or
- Request additional airtanker(s).

As outlined in Section 9.1, any request for additional airtankers must include the following information:

- Type of airtanker group required (long term retardant or skimmer)
- Number of airtankers required
- Airtanker(s) only or entire group including the birddog
- The working birddog on the fire
- The group bombing frequency.

As the airtanker receives exit instructions, the birddog will instruct the airtanker to:

- (Airtanker base) and Stay – there are no more anticipated requests.
- (Airtanker base) and Reload – return to the incident to deliver another load.

20. Stop Action

The Air Attack Officer, Incident Commander, or the Forest Area Duty Officer may terminate airtanker action. The Air Attack Officer shall consult the Incident Commander and/or the Forest Area Duty Officer prior to stopping action on any fire. Missions are terminated because of one of the following reasons:

- **Objectives Achieved** - Once the mission objectives have been achieved, the action is terminated. Confirm with the Incident Commander that they have sufficient resources on site or enroute prior to departing the incident.
- **Safety** - Where hazards such as poor visibility, turbulence, terrain, obstacles pose a threat to aircraft safety, airtanker action must be stopped. Any member of the airtanker group may express safety concerns and halt the mission.
- **Beyond Resources** - Airtanker action is halted whenever excessive fire behaviour, size or lack of ground resources challenge the ability of the available airtanker resources to attain achievable objectives.
- **Higher Priority** - The Fire Centre or Provincial Aircraft Coordinator may cancel an airtanker request due to a higher-priority incident elsewhere.

Any stop action due to safety or beyond resources must be followed up with the Incident Commander and/or the Forest Area Duty Officer by the Air Attack Officer when they return to the airtanker base.

21. Cancelled Dispatch

Airtanker groups may be dispatched to detection messages / wildfires prior to confirming that airtanker action is required.

If airtanker action is deemed not required prior to the group becoming airborne, the Fire Centre will notify the Airtanker Base Supervisor, who will in turn inform the group via the airtanker base radio frequency 122.05. If an airtanker group is cancelled while airborne, the Forest Area Dispatcher will inform the Air Attack Officer via the local Firenet channel. The group will then be requested to return to base or divert to another request.

In the event of an airtanker-only dispatch, if the airtanker cannot be contacted by the airtanker base or birddog, the Forest Area will inform the airtanker via the satellite phone.

22. Returning to Base

22.1. Airtanker Action is Complete

After all airtankers have completed action, the birddog will make a pass over the fire at low level and the Air Attack Officer will activate the all-clear (wail) siren to signal to the ground crews that the airtankers have completed action. The birddog will normally remain over the target to complete tasks such as:

- Update the Incident Commander and ground crew,
- Communicating fire updates,
- Observing or photographing the fire behavior, etc.,
- Provide an update to the Fire Centre,
- Turn over airspace control responsibilities to remaining aircraft assigned to the incident.

Once an airtanker group has completed their objective, the Air Attack Officer may advise the Airtanker Base Supervisor and/or Forest Area Duty Officer on the status of the group (i.e. fuel remaining for the birddog and airtanker; retardant on board; remaining duty day; etc.). This will aid in decision making for possible diversions and refueling requirements.

Before releasing any airtankers that are not part of their group, the Air Attack Officer will contact the Fire Centre via the local Firenet channel to confirm if there are any requirements for the airtanker within the Forest Area. The birddog team will communicate instructions for reassignment to the airtanker over the bombing frequency. If there are no requirements, the birddog team will release the airtanker(s) and instruct them to call the PAC. One airtanker from each group will call the PAC cell phone (if no response, the AWCC main line is the secondary phone number) via the satellite phone and inform them that they have been released, before returning to their base. The information will be given as in the following example: “Tanker 487 released.” At that time, the PAC will either request more information regarding their fuel / retardant status and fill outstanding airtanker requests or instruct them to return to base.

22.2. Inbound the Airtanker Base

Navigate to the base and provide an ETA to the Fire Centre. The airtanker group will remain vigilant for new fires whenever airborne. Airtanker(s) transiting without a birddog are required to have their satellite phone switched on to receive calls for dispatches or diversions. All aircraft should call and/or monitor the airtanker base radio frequency 122.050 when approaching the destination base. As each aircraft approaches the airtanker base, advise the Airtanker Base Supervisor:

- Intentions (stay vs hold vs reload)
- Request fuel as required
- Request any additional supplies/services required

22.3. Aborting Loads

If an airtanker request has been cancelled, airtankers may have to jettison a portion of the retardant load at a designated abort area to achieve maximum landing weight.

If a birddog and Air Attack Officer is available to directly supervise an abort, they will be present before any retardant is released. The birddog shall assess the drop zone, and fly the intended run prior to the airtanker releasing any retardant. If no birddog is available, the airtanker may proceed with the abort, but shall:

- Overfly the drop zone, ensuring no people, or infrastructure is within the intended drop area.
- Maintain a minimum drop height of 500 feet AGL
- The jettisoned volume of retardant must be documented on the Drop Report and entered into FIRES program.

Abort area locations are marked on digital maps carried in the birddog, or may be obtained by contacting the Fire Centre or Airtanker Base Supervisor.

22.4. Landing

The Air Attack Officer is responsible for the following when the birddog is on final approach for landing:

- Ensure FLIR camera is in the stowed position
- Cords and equipment are away from the control column, and stowed for landing
- Scan the runway ahead to ensure the landing surface is free of other aircraft, objects/wildlife etc.
- Inform the Fire Centre that the birddog aircraft is on final to land at (name of airport)

Air Attack Officers are an added layer of protection against landing with gear retracted or in an unsafe condition.

In the TC690 Turbo Commander:

- Look out the right window, and confirm the right main landing gear is extended, and appears to be in the locked position.
- Look at the spinner of the right-hand engine, to see the reflection of the nose gear.
- Confirm the three green landing gear indicator lights are illuminated.

In the C208 Grand Caravan:

- Assess the condition of the right landing gear & tire (the gear is non-retractable).

22.5. Parking Loaded Airtankers

Ensure loaded airtankers are parked on the apron's concrete pads whenever possible. Loaded airtankers parked on asphalt may create ruts or divots on the surface.

22.6. Group back at the Airtanker Base

Once an airtanker group has returned to an airtanker base, the group shall prepare for the next dispatch: Advise the ATB Supervisor or Fire Centre duty officer when the group is expected to be available for the next dispatch.

Refuel and prepare each aircraft for its next mission. Birddogs are normally refueled before airtankers. Ensure all paperwork and documentation is completed.

Conduct an after-action review as soon as feasible. A post-mission after action review is required after each mission. Schedule this review as soon as possible following the mission, and depending upon complexity or number of identified issues, a formal or informal session may be held. Refer Section 3.3 to for additional information on AARs.

23. Administration

23.1. Drop Reports

Drop reports must be entered into FIRES by the end of the AAO's shift.

23.2. Cancelled Dispatch Report

All cancelled airtanker dispatches must be recorded within the FIRES database. The information must include: time and date of dispatch, group dispatched, AAO, fire/detection number, cancelled/diverted time, aircraft roll times, volume of retardant aborted if applicable.

23.3. Wildfire Photos and Video

All photos/videos taken while engaged in wildfire operations are property of the Government of Alberta. Photos/videos will not be given out to any individual/company/news affiliate/social media unless permission is obtained by the Director of Wildfire Operations.

The Air Attack Officer is expected to take digital photos of all wildfires actioned. These photos must include:

- Views of the incident upon arrival
- Significant changes in fire behavior and/or operational events
- Views of the incident before departure

Photos must be time and date stamped, and labelled with the incident number and the AAO's name.

If possible, photos should be emailed in "real time" to the Forest Area WFOPs and the AWCC email accounts. All photos must be emailed at the end of each day to the Forest Area WFOPs and the AWCC email accounts.

23.4. Forward-Looking Infrared (FLIR)

All Air Attack Officers shall be proficient in the operation of the FLIR camera in their specific birddog. Training manuals for each type are available on the FireDrive.

All suspected human caused fire missions must be recorded on the FLIR data card. Emphasis should be placed on recording infrared footage of the suspected point of origin and any people or vehicles near the fire. The recorder hard drive will store the video files for the entire season. If specific fire videos are required for investigation purposes, the AAO will be required to download the video from the hard drive on to a thumb drive (provided in the kits).

When requested by the Investigation Unit, thumb drives must be mailed as soon as possible (by government courier) in the provided envelopes to investigation staff at Wildfire Management Branch in Edmonton.

The FLIR Kit contains:

- External hard drive c/w USB cable
- Multiple compact thumb drives
- Storage case for the above items. Each kit case has the Group # labelled on the exterior

The AAO shall operate the birddog's FLIR camera during every practice to ensure that all systems operate correctly, and the AAO remains proficient in its use.

All personal opinions and analysis must be avoided in the FLIR dialogue and when labelling images/FLIR files.

23.5. Quick strike/Border Zone/Mutual Aid Fire Procedures

Airtanker groups may be dispatched into neighboring jurisdictions to assist in wildfire suppression missions. The following information from these missions must be sent to the Provincial Aircraft Coordinator on the day of the mission:

- All drop reports (using requesting agency forms if possible).
- After Action Reviews
- Aircraft flight times (AO-02 sheets)
- Volume of retardant loaded from Alberta airtanker bases, and used on that mission.
- Fuel tickets from refueling during/after the mission, whether in Alberta or elsewhere.

23.6. Initial Fire Assessments (FP 41)

If an Air Attack Officer is the first resource arriving on an incident, the AAO must submit an *Initial Fire Assessment* (FP 41) report. The Air Attack Officer must then follow up the written or emailed electronic copy of the complete FP 41 assessment to the Area Office by the end of their shift.

23.7. Daily Flight Reports (AO-02)

To ensure accurate flight information for admin purposes, daily flight activity, fuel usage, and aircrew expenses will be recorded for each aircraft under contract, using the Daily Flight Report (AO-02) form. If no revenue flights have been performed during the day, an AO-02 will still be completed which will have information on aircrew expenses (accommodation, rental vehicles, meals not supplied by Alberta Wildfire), and a written "No Fly" on the form.

Airtanker Base Supervisors and Air Attack Officers are authorized to sign as an Alberta Wildfire representative. Normally the Air Attack Officer approves birddog flight tickets, and the ATB supervisor approves airtanker flight ticket(s).

23.8. Flight Crew Meals

When the alert status of an airtanker group indicates the group will be 'on base' during a meal period, the airtanker group is responsible to supply their own food while on base.

When airtanker groups fly through the meal period, end up at another base as a result of fire action, or are called to base without time to acquire a meal (this may include an early ‘stand to’ before stores are open or getting ‘off base’ at night after stores are closed), the following will apply:

- A hot ‘sit down’ meal at the Airtanker Base can be provided at the discretion of the Forest Area in conjunction with the Air Attack Officer. The meals may be from the camp kitchen or ordered from a restaurant. If a flight crew member partakes in this meal, (breakfast, lunch or dinner), they are expected to sign for the meal, and must record it on the A0-02.

Where Wildfire Management Branch provides a light lunch meal ‘on-the-fly’ to keep the aircraft airborne, the meal can be claimed by the flight crew on their expense account.
Refreshments such as juice and bottled water will be provided for the flight crews during fire operations. Coffee, tea and water will be available to the flight crews while on base.

The AAO and ATBS determine when food should be ordered to keep airtanker groups engaged in operations.

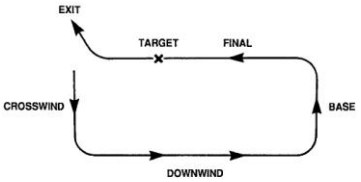
24. Appendices

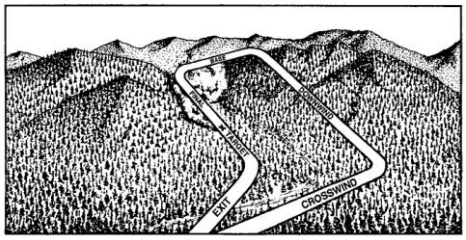
24.1. Appendix 1 – Glossary of Firebombing Terms

Abort	A planned release of retardant in order to achieve an aircraft's maximum landing weight. It is recommended, but not mandatory, that a birddog accompany the airtanker to the designated abort zone to facilitate the drop.
Armed	A confirmation by the airtanker pilot that the drop system is correctly configured to trigger the release of the load as requested by the birddog team.
Base Leg	The leg of the bombing circuit immediately preceding the **final leg.**
Called Shot	A drop technique whereby the birddog cues the airtanker drop release point by verbal command, saying "3, 2, 1, Now".
Cleared the Run	A call from the birddog to confirm that the airtanker may descend from the stack and share the same airspace as the birddog. Visual contact must be acquired by one or both of the aircraft in the working airspace below the stack. Cleared the Run also confirms that ground personnel or other aircraft are clear of the drop zone and it's safe to release the load as described.
Compartmented Tank	A tank design containing several separate compartments, each with its own non-fluctuating door. The doors may be opened individually, simultaneously or in sequence to achieve a desired retardant pattern on the ground. Note that once a door is opened, the entire contents of its compartment are released.
Coverage Level	The concentration of retardant dropped from a variable constant-flow tank. A Coverage Level 1 equates to 3.78 litres per $9m^2$ of ground (or 1 US gallon per 100 ft^2).
Crosswind	The leg of the circuit over an airport or bombing target that precedes the **downwind leg**.

Demonstration Run	A simulated bombing run made on a target by the birddog to assess hazards, identify the target, direction of run and safe exit path to the observing airtanker. May also be called a dummy run or show me.
Drift	Advice or indication that a wind condition exists of sufficient velocity to significantly affect drop placement and that a correction factor must be applied by the airtanker pilot.
Downwind Leg	The leg of the bombing circuit immediately preceding and perpendicular to the **base leg.**
Drop Assessment	The Air Attack Officer will access each drop from an airtanker for accuracy and effectiveness. Drops will be rated as a bullseye, short, long, left, right or offline. Short and long drops are rated as a fraction of the entire load in ¼ length increments. Left and right drops are assessed using the width of the load as a reference. Other factors that can be assessed include drop height, speed, coverage, foam and drift.
Drop Height	Height of the airtanker at load release, usually given in feet above the tree canopy or the bare ground.
Dummy Run	A simulated bombing route flown to a target by the birddog to indicate the target and route to the airtanker. May also be called a show me or demonstration run.
Extend	An instruction to **tag on** to and lengthen a retardant line in the required direction.
Final	A live bombing run where the airtanker intends to make the drop.

Firebombing Circuit





FLIR

Forward Looking Infra-Red. A camera that captures and enhances thermal infrared signals, combined with visible light, enabling the user to see objects and differences in heat through an obstructing medium such as smoke.

Fire Traffic Area (FTA)

The portion of airspace within 5 nautical miles of a wildfire perimeter, extending to 3000 feet above ground. The FTA dimensions may be amended by NOTAM. As per CAR 601.15, no unauthorized person may operate an aircraft over a forest fire area, or over any area that is located within five (5) NM of one, at an altitude of less than 3000 feet above ground level. If additional space is required, a request must be made through the area office to have a Notice to Airmen (NOTAM) issued by Nav Canada describing the amended restricted area (CAR 601.16).

Gap

An area within a retardant line on the ground with weak or ineffective retardant coverage.

Half on / Half off

A drop made overlapping a linear reference on the ground (the fire edge, previous retardant drop, etc.). This technique may be used to simultaneously cool burning fuels, and guard adjacent unburned fuels.

Head

The most forward end of the retardant drop on the ground.

Hold the Load	A command issued by the birddog team to cancel the clearance to drop its load. This command is generally issued when an airtanker is flying an incorrect path, or it is no longer safe to drop on the target. The airtanker will fly the exit as described and await instructions from the birddog.
Inspection Run	A pass overhead the target by the birddog or airtanker to assess the run.
Late	Assessment that the drop is to be or was triggered beyond a designated point.
Lead-in	A technique whereby the airtanker follows directly behind the birddog through the circuit to the target.
Line Astern	Directing two or more airtankers or water skimmers to drop on a given target while occupying the same airspace simultaneously. The second and each subsequent aircraft follows the flight path flown by the lead aircraft.
Load	The capacity of a single airtanker's tank when full.
Load Width	The width covered by a given retardant/water drop on the ground.
Lone Wolfing	Lone wolfing refers to an airtanker conducting low-level drops without supervision of a birddog. Lone wolfing is prohibited in Alberta.
Long	Assessment that the drop landed beyond a designated point.
Marker Load	A drop strategically placed as a reference point used for subsequent drops.
Orbit and Direct	A technique whereby the birddog orbits overhead the incident after flying an initial low-level demonstration run and verbally identifies targets to airtankers or water skimmers.

Provincial Aircraft Coordinator (PAC)	An individual based in the operations room at AWCC, responsible for the coordination of safe and efficient use of provincial aviation assets.
Quickstrike	A mission in which an airtanker group is dispatched to an incident in a neighboring jurisdiction, and returns to their assigned base upon completion. Airtankers may reload or refuel in the other jurisdiction prior to returning home.
Reload	An instruction to an airtanker to proceed to a designated airtanker base for another load of retardant and return to the same incident.
Rising Ground	Indicates that the ground ahead or beside the target is higher than the target altitude itself.
Roll-up	Connecting the head end of a dropped load to a given reference point on the ground.
Round	The capacity carried by an entire airtanker group, whether one or more aircraft.
Salvo	A technique whereby a specified number of doors in a compartmented tank are opened simultaneously to give a heavier, more concentrated drop pattern on the ground.
Short	An assessment that the effective portion of the drop landed before a designated point.
Show Me	A simulated bombing route flown to a target by the birddog to indicate the target and route to the airtanker. May also be called a dummy or demonstration run.
Span	Refers to a distance equal to the wingspan if the airtanker being used.
Split Stack	A method of separating airtankers into two stacks. This may be required due to operating differences between aircraft, or due to insufficient vertical space to accommodate all aircraft in a single stack.

Stack	An established holding pattern over a fire for airtankers awaiting drop instructions. Aircraft will be separated at 500 ft. intervals. The working birddog controls the stack movements. If the ATGS role has been activated, the ATGS team will assign stack entry altitudes for incoming aircraft.
Stack Check	A radio request, which will initiate a sequential report by all aircraft within an operational stack to report their tail number and current altitude. The lowest or 'working' airtanker will report first, followed by each aircraft in ascending vertical order, including any aircraft within five minutes of the fire who has been assigned a stack entry altitude. Any aircraft may request a stack check in order to eliminate confusion or to reacquire situational awareness.
Start-Stop	An instruction to an airtanker equipped with a constant flow tank to drop a line of retardant connecting two identified points on the ground at a given coverage level, without specifying the desired portion of the tank's capacity. (i.e.: "Start-Stop, Coverage Level 4").
Stay	An instruction issued to the airtanker to proceed to a designated location and await a new dispatch.
Step Left/Right	An instruction for a following airtanker in a line-astern formation to overlap their drop on the indicated (left or right) side of the previous drop.
String Drop	A drop in a compartmented tank in which doors open in succession at a defined interval, giving a less-concentrated drop pattern over a longer area on the ground.
Tag On	Connecting the tail end of a retardant drop to a given point on the ground.
Tail	The aft end of the retardant drop on the ground.
Target Altitude	The indicated altitude in feet above sea level of the release point of the retardant over the target. Allows the airtanker pilot to fly a flight profile within the bombing circuit towards the desired release altitude. Target altitudes are generally 150'-200' above the height of the tree canopy below.

Variable Constant Flow	A type of retardant tank design using an onboard computer to control a set of two doors which meter the flow of retardant to a specified coverage level on the ground. The tank generally contains a single compartment. 'Variable' refers to the ability of the doors to fluctuate their aperture during the drop to account of varying head pressures in the tank. "Constant Flow' refers to that fluctuation producing a consistent coverage level on the ground.
Wail Siren	Siren signal to the ground crews that airtanker operations in the area have been completed. The wail or all-clear siren should be accompanied by verbal confirmation with the relevant ground contact.
Working Birddog	The operational or low-level birddog, sometimes referred to as the tactical birddog. The working birddog manages the airtanker stack above the fire.
Yelp Siren	Siren signaling the ground crews of an intended and/or imminent drop from an airtanker. All ground personnel must move clear of the drop zone, and verbal or visual confirmation of personnel safety shall be received by the AAO prior to clearing the airtanker(s) for the run.

24.2. Aquatic Invasive Species (AIS) Prevention and Decontamination Procedures

While protecting firefighter and public safety remains the first priority, aquatic invasive plants and animals (i.e.: zebra mussels, fish infected with whirling disease) pose a risk to Alberta's natural ecosystem. Preventing exposure to AIS through best-management practices is the easiest and most effective manner of controlling their spread.

24.2.1. Imported Aircraft Decontamination Procedures

Whenever helitankers, helicopters with buckets, or skimmer airtankers enter Alberta, they must be thoroughly decontaminated and dried prior to being utilized in Alberta waterbodies. Decontamination of these aircraft is not required for quick strikes into neighboring jurisdictions unless directed by the Provincial Aircraft Coordinator. For skimmer aircraft, the Fire Centre Duty Officer, with guidance from the Provincial Aircraft Coordinator, will arrange for a steam truck to be on-site upon the aircraft's arrival

24.2.2. Preventing Whirling Disease Spread from Infected Areas

Whenever possible, avoid operating from known or high-risk whirling disease watercourses. If operating in the infected areas is unavoidable:

- Avoid dipping or scooping water from multiple water sources within the same operational period to minimize cross-contamination of water sources.
- If possible, do not transport water between drainages.
- Use deeper (blue) water whenever possible. Avoid shallow areas that are likely to disturb mud or plants.

If contamination of equipment with raw water or mud/plants is unavoidable, follow the aviation decontamination procedures.

24.2.3. Aviation Decontamination Procedures

- Chemicals such as bleach and quaternary ammonium compounds do not meet corrosion requirements for aluminum and shall not be used on aircraft fuselages or water delivery components such as helicopter buckets and foot valves
- Visually inspect aircraft surfaces (floats, tanks, intakes, water buckets, snorkels) daily, during maintenance, and after every water dropping mission
- Remove visible plants and mud from external surfaces
- Decontaminate all exposed surfaces by power washing with hot water (≥90°C) for 5-10 sec (up to 5 minutes preferred) before moving to new water sources
- Allow all surfaces to thoroughly dry