

Basic Aviation Risk Standard

Aerial Mustering





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Purpose

Aerial stock mustering incorporates the use of aircraft to locate, direct and concentrate livestock while flying below 500 feet above ground level. It is used to complement traditional mustering techniques using horses and motorcycles. For the purpose of this Standard, mustering operations means activities related to the aerial supervision and control of livestock that are controlled by helicopter and fixed wing and include: (1) Aerial stock mustering; (2) Aerial stock spotting; (3) Animal culling; and (4) Flying training to carry out such activities.

The advantages of using aviation capabilities are realized through safety of minimizing personnel on the ground, cost effectiveness and overall efficiency of the muster. Notwithstanding, industry accident rates have provided recognition that operating aircraft to the edges of their performance envelope in the low-level environment present additional risks to standard aviation practices. Additional controls over and above regulatory minimums and specific to this flight regime are required to manage this risk.

This Standard provides companies with minimum requirements for contracted aerial mustering activities and is designed to encourage a risk-based approach to manage the activity.

All national and international regulations pertaining to aviation operations must be followed. This Standard is designed to supplement those requirements.

Document Structure

The Standard is presented in a risk-based format to emphasize the relationship between threats to aerial mustering operations, associated controls and applicable recovery/mitigation measures as presented in Figure 1.

The format is intended to assist all company personnel engaged in coordinating aviation activities to manage and understand the aviation risk to their operation.

All companies and aircraft operators are encouraged to further risk assess all controls to the level of detail they consider necessary for their individual operations.

Aircraft Operator Review

This Standard is designed to be used as a primary reference for the review and approval of aircraft operators supporting companies involved in contracted aerial mustering activities. Aircraft operators will be audited to the BARS Question Master List with questions drawn from this Standard.

Variations

Any variation to this Standard is at the discretion of each company. It is recommended that each variation be assessed to demonstrate that the risks associated with the variation are tolerable and justify safe continuation of operations.

Key Definitions

Company

Refers to the individual entity using this Standard to support their aviation operations.

Operator

Refers to an aircraft operating company used to provide aviation services.

Competent Aviation Specialist

A company designated aviation advisor or Flight Safety Foundation BARS Accredited Auditor.

Figure 1: BARS Bow Tie Risk Model – Schematic of Aviation Risk Management Controls and



Recovery Measures for Aerial Mustering.



Aircraft Accident



Recovery Measures

<ul style="list-style-type: none">Fuel Tank StandardsUpper Torso RestraintsHelmetsClothingCrashworthiness	Impact Survival
<ul style="list-style-type: none">First-aid KitSurvival Kit	Land Survival
<ul style="list-style-type: none">Flight FollowingEmergency Locator Transmitter and Satellite Telephone	Alerting
<ul style="list-style-type: none">Emergency Response Plan	SAR/ Emergency Response
<ul style="list-style-type: none">Insurance	Post-accident

All Threats 1.0: Common Controls

Common controls that apply to all threats outlined in this Standard

Common Control 1.1: Approved Aircraft Operator

Use only licensed aircraft operators with a current Air Operators Certificate (AOC) and who have been approved for use by company established process. Aerial mustering is not to be conducted under the Private Operations category. Passengers are not to be carried during aerial mustering operations and the activity is to be conducted single-pilot.

Common Control 1.2: Flight Crew Qualifications, Experience and Recency

For contracted operations, flight crew engaged in aerial mustering must have:

- A current and valid Commercial pilots licence;
- A valid mustering endorsement for the category of aircraft used;
- 2000 hours total time*, 1500 hours Command time;
- 500 hours Command time in aerial mustering operations;
- 500 hours Command time on aircraft type*;
- 50 hours in preceding 90 days, 10 on the aircraft type. Or completion of a Proficiency Check on the aircraft type;
- Three years' ground-based cattle experience as a ringer or station hand; and
- Two seasons' previous aerial mustering experience as a pilot.

* Hours requirement maybe approved by Head of Flight Operations if prior agreement obtained from client.

Common Control 1.3: Chief Pilot

The Chief Pilot overseeing flight operations must be able to demonstrate:

- A minimum of two years in an aviation operations supervisory capacity, including oversight and coordination of multiple aircraft engaged in a single mustering operation;
- The knowledge and a process to apply fatigue risk management principles towards assigning flight crew to any particular mustering activity; and
- Having read and understood all requirements of this Standard and a process in place to ensure all contracted flight crew know and understand contracted expectation.

Common Control 1.4: Flight Crew Check and Training

Flight crew must receive annual training to the standards of the appropriate civil aviation authorities and one flight check annually that at minimum includes low-level engine-out procedures, simulated limited power and down-wind operations and in the case of fixed wing aircraft stall recovery procedures.

Common Control 1.5: Basic Aircraft Equipment Fit

Aircraft basic equipment fit must at a minimum include:

- A serviceable UHF radio with compatible channels to all station vehicles and ground personnel. Actions in the event of UHF radio failure must be briefed as part of the pre-start Operational Risk Assessment. The radio must be panel mounted with an aviation design authority approval and usable through the pilot's helmet boom microphone;
- 406MHz TSO C126 Emergency Locator Transmitter (ELT). See also Defence 10.9;
- Upper Torso Restraint. See also Defence 10.2;
- Clear and unscratched canopies and Perspex;
- Approved Flight Manual Supplements accompanying any removal of doors; and
- Means of dipping fuel tanks (or other acceptable means other than fuel gauge) to verify fuel quantity during partial fuel load operations.

Common Control 1.6: Drug and Alcohol Policy

The aircraft operator must have a Drug and Alcohol Policy which meets all requirements of the responsible regulatory authority. Where no such regulatory requirements exist the operator must at a minimum meet the requirements of the contracting company.

Common Control 1.7: Flight and Duty Time Limits

Follow all aspects associated with local regulatory guidance specific to aerial mustering operations, such as Civil Aviation Safety Authority (CASA) Instrument number CASA 98/14 dated 5 June 2014.

Consistent with the provisions of regulatory requirements, the aircraft operator must be able to demonstrate their process for ensuring a pilot's non-mustering flight and duty time is tracked in accordance with standard flight and duty time regulations.

Common Control 1.8: Aircraft Operator Safety Management System

All aircraft operators must have a Safety Management System (SMS) that is fully integrated throughout and across each part of the organization and is appropriate for the size and complexity of operation. While many aviation bodies provide SMS frameworks, the Civil Aviation Safety Authority (CASA) SMS for Aviation – A Practical Guide 2nd Edition provides useful fit-for-purpose guidance on SMS development.

Common Control 1.9: Accident and Incident Notification

As part of their SMS, the aircraft operator must advise the nominated point-of-contact within the contracting company of any incident, accident or non-standard occurrence related to the services provided to the company that has, or potentially has, disrupted operations or jeopardized safety. This must be conducted verbally within 24 hours of the event occurring.

Common Control 1.10: Operational Risk Assessment

Aircraft operators must conduct a risk assessment, including mitigation controls, before commencing operations for any new or existing aviation activity. At a minimum the topics listed in Appendix 1 must be covered. One risk assessment for a complete muster is the minimum requirement, unless there are any major changes to the conduct or planning of the muster in which case a revalidation of the existing risk assessment is to be carried out.

Common Control 1.11: Sub-chartering Aircraft

Sub-chartering (cross-hiring) by the aircraft operator must not be undertaken without approval of the contracting company.



Threat 2.0: Runway Excursions

An aircraft experiences loss of control during takeoff or on landing and results in an accident

Threat

Threat 2.0:
Runway Excursions

Controls

- Airfield and Helipad Design
- Airfield Inspections
- Landing Site Assessments

Control 2.1: Airfield and Helipad Design

Airfield and helipad designers should reference Civil Aviation Advisory Publication (CAAP) 92-1 (airfields) and 92-2 (helipads) for design purposes. BARS Implementation Guidelines (BIG) Section 4 provides additional guidance for short-term or emergency use airfields whilst Section 5 provides additional guidance for helipad standards.

Where doubt exists in the design capability required, aviation specialist advice should be sought.

Control 2.2: Airfield Inspections

Long-term airfields and helipads used must be covered by a system of inspection and preventative maintenance.

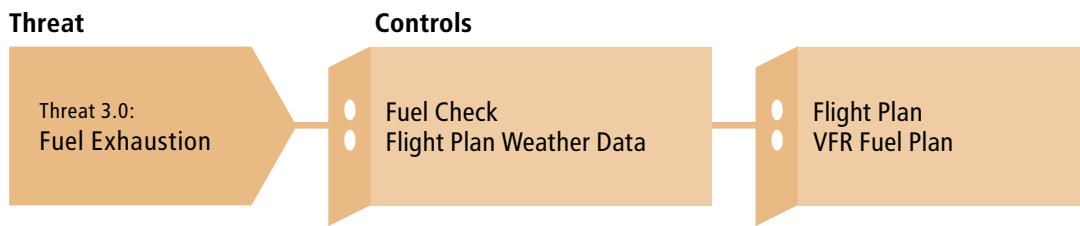
Control 2.3: Landing Site Assessments

Aircraft operators must conduct landing site assessments prior to commencing operations. Incorporate the results into the operational risk assessment (Controls 1.10 and 7.2).



Threat 3.0: Fuel Exhaustion

An aircraft conducts a forced landing as a result of fuel exhaustion and results in an accident



Control 3.1: Fuel Check

The aircraft operator must have procedures in place that require the Pilot to ensure the required amount of fuel is on board the aircraft prior to each flight.

Control 3.2: Flight Plan Weather Data

Provide the flight crew with access to reliable weather information when determining fuel loads in pre-flight planning.

Control 3.3: Flight Plan

Continuous flight-following by the contracting company during the muster, and the aircraft operator during transit, must be maintained throughout all flight activities. The flight-following arrangements are to be briefed during the Operational Risk Assessment (ORA) completed pre-muster.

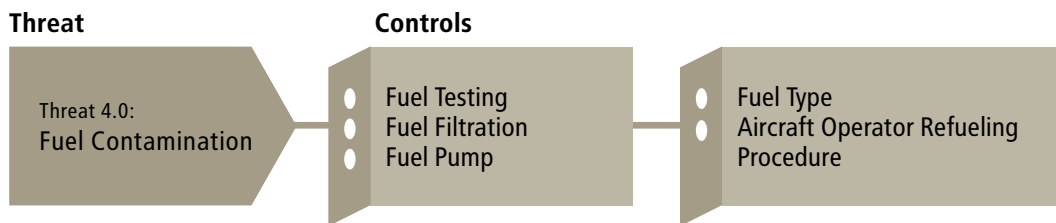
Control 3.4: Visual Flight Rules (VFR) Fuel Plan

Fuel loads must cover the planned task and a minimum of 20 minutes fixed reserve carried on all mustering activities.



Threat 4.0: Fuel Contamination

An aircraft conducts a forced landing as a result of fuel contamination and results in an accident



Control 4.1: Fuel Testing

The Pilot must verify that the quality of the fuel being uplifted is acceptable for operation of the aircraft.

Control 4.2: Fuel Filtration

Equip fuel delivery systems including portable systems with particle filter, or if using Jet A1 fuel then a water blocking filter of the Go/No-Go type.

Control 4.3: Fuel Pump

Fuel pump must be provided by the aircraft operator and approved for aviation use.

Control 4.4: Fuel Type

Only Avgas is to be used for piston aircraft operations. No use of MOGAS in any quantity or mix is acceptable.

Control 4.5: Aircraft Operator Refueling Procedure

Aircraft operators must have a documented procedure addressing the refueling practices and management and use of drummed fuel stock. The following performance requirements in the procedure must include:

Bonding

All refueling components must be bonded to each other and the refueling nozzle bonded to the aircraft before removing fuel tank caps.

Drummed Fuel

Storage:

- Drums must be stored horizontally with access bungs at 3 and 9 o'clock; or vertically with drum top cover in place to prevent the accumulation of water on the drum lid; and
- Drums must have minimal contact with the ground (using wooden slats or equivalent) and be stored under cover.

Quality:

- Fuel must be used within its Aviation Release Note certification date;
- The access bungs must be tight and the seals unbroken prior to use;
- The fuel must be sampled and include assessment for the presence of water;
- The refueling pump must be equipped with a delivery line filter. For Jet A1 this must be a Go/No-Go filter; and
- Before fueling the aircraft, a small amount of fuel must be pumped into a container to inspect for any contamination and to also flush the delivery systems. For Jet A1 the sample must be checked with unexpired Shell Water Detector Capsules.

To provide optimum opportunity for any contaminants to settle, drums must be brought to the vertical and not moved for:

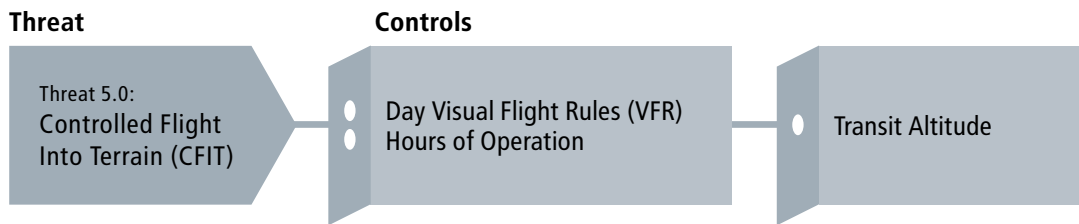
- Avgas 30 minutes prior to use; and
- Jet A1 three hours prior to use.

Where this is not practical (e.g. remote fuel caches) all performance requirements of this control must be followed.

At the completion of the refuel, bungs are to be re-inserted and tightened to prevent the ingress of contaminants.

Threat 5.0: Controlled Flight Into Terrain (CFIT)

An airworthy aircraft under the control of a pilot is flown into the ground resulting in an accident



Control 5.1: Day Visual Flight Rules (VFR)

Aerial mustering activities must only be conducted in daylight conditions under Visual Flight Rules.

Control 5.2: Hours of Operation

Aircraft involved in aerial mustering activities will not become airborne prior to beginning of civil twilight and must be on the ground 15 minutes prior to published end of civil twilight. Shadows caused by terrain and vegetation must be taken into account when calculating last light and adjusted where necessary during the Operational Risk Assessment (ORA).

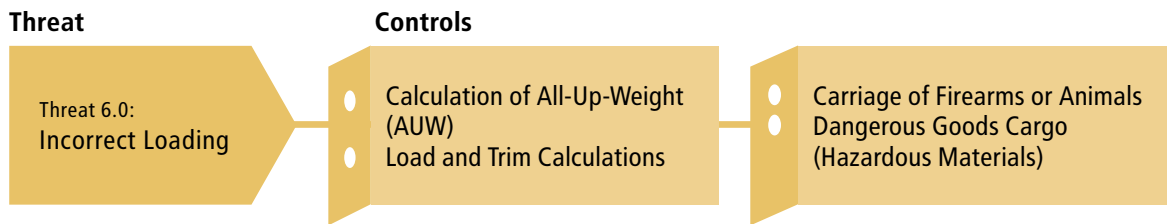
Control 5.3: Transit Altitude

Aircraft in transit between an operating area and the landing site must operate at no lower than 500 feet above ground level.



Threat 6.0: Incorrect Loading

Incorrect loading of the aircraft results in an aircraft accident



Control 6.1: Calculation of All-Up-Weight (AUW)

The Pilot must use actual weights associated with fuel loads, pilot, survival kit and any items additional to the basic aircraft weight when calculating the takeoff weight of the aircraft. The AUW must be within Flight Manual limits for the ambient conditions the aircraft is being operated in.

Control 6.2: Load and Trim Calculations

The pilot will ensure that fuel and oil requirements are correct and that weight and centre of gravity limits of the aircraft have been calculated and are within limits for flight.

Control 6.3: Carriage of Firearms or Animals

Formalized aerial culling with appropriate regulatory approval can be approved by the contracting company on an as required basis.

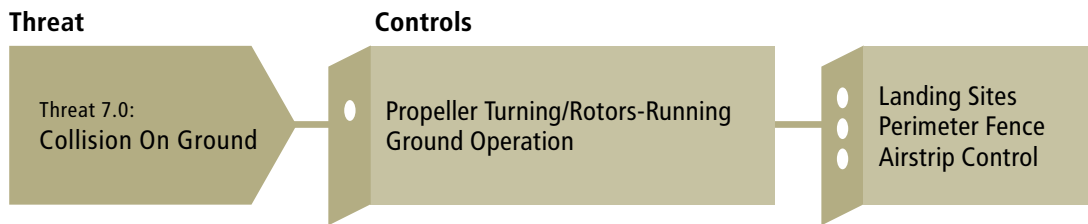
Control 6.4: Dangerous Goods Cargo (Hazardous Materials)

Comply with current International Air Transport Association (IATA) requirements associated with Dangerous Goods Regulations. All pilots must complete dangerous goods awareness training at least every two years.



Threat 7.0: Collision on Ground

An aircraft and an object collide on the ground resulting in an accident



Control 7.1: Propeller Turning/Rotors-Running Ground Operation

When operating on the ground the pilot at the controls must only perform cockpit duties that are essential to operation of the aircraft and must remain aware of external hazards and movement around the aircraft.

Control 7.2: Landing Sites

All landing sites and refueling areas must be assessed by the Pilot as being suitable for the type of aircraft being operated.

Control 7.3: Perimeter Fence

Unless otherwise agreed by a formal risk assessed process, construct a perimeter fence around all company owned and operated permanent airfields to prevent access by livestock, other animals and traveling pedestrians.

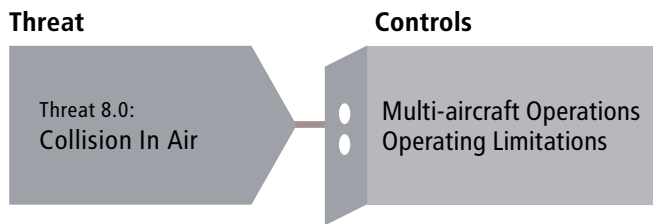
Control 7.4: Airstrip Control

All airstrips must have personnel who are accountable for overseeing and managing the strip and operating standards. Responsibilities include having a basic understanding of the local aviation regulatory system and guidance material, serviceability requirements and inspection criteria.



Threat 8.0: Collision in Air

An aircraft and object collide in air resulting in an accident



Control 8.1: Multi-aircraft Operations

If multi-aircraft operations are to be considered for the conduct of a single mustering activity, the following conditions must be met:

- A senior pilot is designated for the muster and establishes clear separation procedures prior to each day's flying;
- All aircraft are fitted with serviceable strobe lights;
- The aircraft operator will have established Standard Operating Procedures documenting a process that pilots can use to ensure adequate separation is met. At a minimum this will require aircraft to operate in two distinct areas with clear demarcation references to be identified and briefed;
- Positive two-way radio communications are maintained between all aircraft throughout the mustering activity; and
- All aircraft are to use the same area QNH.

Control 8.2: Operating Limitations

Operations at lower than 100 feet above any person or vehicle is to be avoided as much as possible to minimize the risk of inadvertent collision. Furthermore, the aircraft is not to cross a boundary fence by more than 500 metres unless positive separation from any other aircraft can be assured.



Threat 9.0: Structural or Mechanical Failure

Structural or mechanical failure of the aircraft results in loss of control and an accident

Threat

Threat 9.0:
Structural or
Mechanical Failure

Controls

- Dropping of Articles
- Supply of Spares
- Maintenance Action
- Measurement of Aircraft Flight Time

Control 9.1: Dropping of Articles

Unless appropriately briefed, risk-assessed and authorized, a pilot must not drop anything out of the aircraft.

Control 9.2: Supply of Spares

Approved maintenance organizations must have a list of approved suppliers that are included in a Quality Assurance Program to ensure that parts received conform to FAA-approved (or equivalent) design data and are in a condition for safe operation.

Control 9.3: Maintenance Action

Maintenance action on the aircraft is not to be performed by a pilot outside of what is permitted by regulation and must only be performed by engineering personnel licensed to work on the aircraft and in accordance with an approved maintenance program.

Control 9.4: Measurement of Aircraft Flight Time

Hobbs meter, or similarly calibrated recording equipment, must be used for the measurement and recording of flight hours to be entered in the maintenance release.

Defences 10.0: Aircraft Accident

Mitigating defences in the event of an aircraft accident

IMPACT SURVIVAL

Defence 10.1: Fuel Tank Standards

Where available for the aircraft type, bladder-type tanks are to be used instead of all-aluminium tanks to improve the fuel system's resistance to a post-accident fuel leak.

Defence 10.2 Upper Torso Restraints

All seats must be fitted with upper torso restraints and be worn at all times.

Defence 10.3 Helmets

Flying helmets manufactured to appropriate industry standards are to be worn by pilots during all aerial mustering activities. Any deviation must be agreed to in writing by the client prior to the muster.

Defence 10.4 Clothing

All pilots must wear at a minimum non-synthetic long trousers and long-sleeved shirt (or fire-retardant flying suit), cotton undergarments and robust enclosed footwear.

Defence 10.5 Crashworthiness

Nothing is to be stored underneath the pilots' seats that could invalidate crashworthiness of the seats. Furthermore, any article or equipment carried in the cockpit must be appropriately restrained.

LAND SURVIVAL

Defence 10.6: First-aid Kit

At least one first-aid kit must be carried on all aircraft.

Defence 10.7: Survival Kit

Survival kits appropriate for the geographical location and climatic conditions must be carried for those operations where search and rescue response times would require use of the equipment.

ALERTING

Defence 10.8: Flight Following

The aircraft operator in conjunction with the station management must establish a system of flight following appropriate for the operation. An Emergency Response Plan must be able to be activated at all times in the event of distress or loss of communications.

Defence 10.9: Emergency Locator Transmitter and Satellite Telephone

An Emergency Locator Transmitter (ELT) meeting the requirements of Technical Standard Order (TSO) 126 (406MHz) or equivalent must be fitted to the aircraft. The responsible party noted on ELT registration as the primary contact is also to be detailed in the aircraft operator's Emergency Response Plan. Additionally, a satellite telephone is to be carried if determined necessary during the pre-start Operational Risk Assessment.

SAR/EMERGENCY RESPONSE

Defence 10.10: Emergency Response Plan

All aircraft operations must have an Emergency Response Plan (ERP) commensurate with the activity undertaken that covers: documented land-before-last-light limitations, exposure considerations, local Search and Rescue (SAR) capabilities, and hazards associated with the surrounding environment.

The ERP must be exercised annually for all long-term operations and include a bridging document detailing lines of communications between the company and aircraft operator.

POST-ACCIDENT

Defence 10.11: Insurance

It is the responsibility of the contracting company to determine the level of insurance required in accordance with company risk management standards.

Such insurance must not be cancelled or changed materially during the course of the contract without at least 30 days written notice to the company.



Appendices

Operational Risk Assessment (ORA)

The Operational Risk Assessment should be a documented process that discusses all hazards and threats associated with aerial mustering. The outcome of the ORA will be to identify clear mitigating controls used to manage the risk associated with this activity.

These mitigating controls should be summarized and briefed to all participants of the Muster Brief.

Table 1: Example of Operational Risk Assessment agenda – any answer ‘No’ requires mitigation and discussion with contracting company’s representative prior to flight.

Minimum Critical Controls	Pilot	Properly licenced and operating under a valid AOC?	Y	N
		Meets all requirements of Control 1.2 and 1.3?	Y	N
		Flight and Duty restrictions understood?	Y	N
		Under D&A program Control 1.6?	Y	N
	Aircraft	Meets all equipment requirements of this Standard?	Y	N
		No maintenance due during muster?	Y	N
		No deferred defects?	Y	N
		Listed under Operator’s AOC?	Y	N
	Fuel	Sufficient aviation fuel procured, with Release Certificate?	Y	N
		Stored appropriately?	Y	N
		Serviceable pump provided by aircraft operator?	Y	N
		Methods of testing, sampling, delivery understood?	Y	N
		Aircraft bonding methodology understood?	Y	N
	Weather	Method of establishing daily weather report established?	Y	N
		Localized weather phenomenon discussed?	Y	N
		Localized impact on civil twilight briefed?	Y	N
	Infrastructure	Day, Visual Flight Rules reiterated?	Y	N
All landing areas reviewed as acceptable?		Y	N	
Methods of wind indication acceptable to pilot?		Y	N	
Impact of rain on landing areas discussed?		Y	N	
Runway Excursions	Takeoff and landing areas reviewed and appropriate?	Y	N	
	Airstrip inspections discussed and understood?	Y	N	
Fuel Exhaustion	Method of refueling and dipping tanks discussed?	Y	N	
	Minimum reserves and time-on-station implications discussed?	Y	N	
Fuel Contamination	Drumstock source, storage and suitability discussed?	Y	N	
	Go/No-Go filter and pump confirmed?	Y	N	
Controlled Flight Into Terrain	Transit altitudes and all operational limits briefed?	Y	N	
	No passenger policy reiterated?	Y	N	
	Awareness of migratory birds or eagles/hawks?	Y	N	
Incorrect Loading	Accurate weight and balance discussed with any operational limitations?	Y	N	
	No Dangerous Goods/weapons/animals confirmed?	Y	N	
Collision on Ground	Pilot at controls at all times emphasized	Y	N	
	No hot refueling conducted confirmed?	Y	N	
Structural or Mechanical Failure	Review of aircraft maintenance release and schedule completed?	Y	N	
	Maintenance action only by approved maintenance organization outlined?	Y	N	
Actions in event of an accident	All Defences in place?	Y	N	
	Emergency Response Plan – Station?	Y	N	
	Emergency Response Plan – Operator?	Y	N	
	Bridging document?	Y	N	
	SARTIME – all responsible parties understood?	Y	N	
	All communications and numbers understood?	Y	N	

Muster Brief – as part of the muster brief the pilot is to:

- Provide an aviation safety brief associated with working around the aircraft;
- Discuss known hazards in the operating area – towers, wires and any other obstacles to aviation;
- Provide a summary of the ORA and any additional controls in the Muster Brief;
- Discuss actions in the event of Radio Failure; and
- Requirement for Radio Discipline during the muster.



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