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NATIONAL TRANSPORTATION SAFETY BOARD

Washington, D.C.

BFA Best Practices – post-accident

(35 Pages)

Industry Best Practices (SUMMARY ONLY)

This Document has been summarized while the full text is being re-structured to be a component of a joint FAA/BFA safety effort)

Developed by the BFA's Professional Ride Operator's Division (PRO) for the safe and effective organization and management of hot air balloon ride operations.

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Disclaimer

This publication is designed to provide a consolidated source of recommendations and information for hot air balloon ride operations as well as provide a source of safety information for pilots and crews in their decision-making process involving hot air balloon ride operations. The information presented is intended to enhance safety by providing information and guidance on the various aspects of owning and operating a successful ride operation. Neither the authors nor the Balloon Federation of America (BFA) are engaged in rendering legal or other professional services. If legal or other technical assistance is required, the services of trained and competent professionals should be sought. This text should not be used as the only source of hot air balloon ride operations and flying information. It is a general guide designed to complement many other resources including safety seminars, Federal Aviation Administration (FAA) and BFA publications and on-going pilot and crew instruction. Pilot and crews are strongly encouraged to learn as much as possible about this subject from other sources and tailor this information to meet your individual needs and flying area.

Hot air balloon activities carry the inherent risks of aviation, weather, pressurized fuel systems, vehicles and fire. Hundreds of variables such as weather conditions, local terrain and congestion, balloon and auxiliary equipment, altitude flying as well as decisions made by individuals not directly involved with the flight are involved in the decision-making process of the hot air balloon operator. Risk levels can vary greatly among passengers, pilots and crew. It is incumbent upon each pilot to select and correctly apply procedures and guidelines appropriate for their experience level, flight conditions, equipment and risk tolerance.

No publication, training or level of experience can reduce the risk of accident, injury or death to zero. ***The pilot in command is directly responsible for and is the final authority as to the safe operation of the balloon.*** *The pilot is also responsible for complying with any and all procedures outlined in the operations manual provided by the balloon's manufacturer as well as abide by all Federal Aviation Regulations (FARs) as contained in Title 14 Code of Federal Regulations (CFR). Nothing in this publication is intended to replace or supersede federally recognized pilot training or federal, state and local rules and regulations.*

The purpose of this publication is to educate and improve the business practices, organization, safety practices and decision-making process of hot air balloon ride operators. The publication is intended to benefit the small weekend ride operator as well as the large corporate operations carrying tens of thousands of passengers annually. The authors and the BFA shall have neither liability nor responsibility to any person or entity with respect to any loss or damage caused, or alleged to have been caused, directly or indirectly, by the materials and information contained in this publication.

Preface

The ballooning community is faced with many complex issues each providing a challenge to its long term success. Issues involving legal liability, insurance, waivers, the Federal Aviation Administration, landowner relations, city and county ordinances, Federal and State laws and regulations, and safety challenge our very ability to enjoy the sport we so love. While these Guidelines are comprehensive and cover a myriad of topics, this handbook intends to concentrate on one principal issue that permeates through many of our challenges – safety of passengers paying for a balloon ride. In addition to passenger safety, this handbook contains a complete set of suggested guidelines to be used by ride operators aimed at improving a balloon ride operator's organization, legal documents and contracts, marketing policies, crisis management, legal organization and ethics. The publication contains a wealth of information for both small and large operators and was developed and written for all involved in balloon ride operations.

The Balloon Federation of America (BFA) has elected to take this pro-active approach and establish a comprehensive set of guidelines that incorporates all aspects of balloon ride operations. It also provides many practical applications and sample forms to be used. This Balloon Ride Operators Guidelines for Excellence Handbook presents the basic knowledge and skills essential for organizing and running a successful ride operation using a well thought out decision-making model that places pilot and public safety first.

The thoughts and opinions expressed in this Handbook are those of experienced hot air balloon ride operators, pilots and crew. It is essential for persons using this handbook to also become familiar with and apply the pertinent parts of 14 CFR, Aeronautical Information Manual (AIM), Balloon Flying Handbook, Risk Management Handbook, Hot Air Balloon Crewing Essentials as well as the performance standards for demonstrating competence required for pilot certification.

Occasionally, the word "must" or similar language is used where the desired action is deemed critical. "Should" means that the application is recommended and "may" means that the application is optional. The use of such language is not intended to add to, interpret, or relieve a duty imposed by Title 14 of the Code of Federal Regulations (14 CFR).

Throughout this publication, the terms "he", "his", "pilot", or "competitor" shall mean a person of either gender.

Mission Statement & Goals

PRO MISSION STATEMENT

PRO was created as a division of the Balloon Federation of America (BFA) to unify hot air balloon tour operations throughout the industry and strengthen the safety standards that these companies operate under. Our mission to provide guests and passengers access to a unique flight experience while providing good, safe, and professional tours.

PRO has discussed issues within the industry and found the need to form a program to suit the special needs of the hot air balloon ride operators as well as address the publics' view of the balloon ride industry.

It is our intention to model our safety standards after those promoted by the Tour Operators Program of Safety (TOPS). To that end, we will develop a comprehensive yet flexible set of best practices, standards, guidelines and educational materials designed to enhance public safety through pilot and ride operator training and education.

GOALS

The goals and objectives of this publication are many. The major goals of the BFA and its PRO are as follows:

- *Develop a system of strengthening safety standards and serve as a reliable and informative resource for regulatory, governmental agencies and insurance companies with the aim of supporting the future of the balloon ride industry.*
- *Present our safety program and PRO membership standards to the Federal Aviation Administration (FAA) and the National Transportation Safety Board (NTSB) with the goal of having them recognized and accepted by those agencies.*
- *Develop a Code of Ethics designed to present the business of providing hot air balloon rides as a legitimate business operated by professionals skilled in balloon flight operations that work with the regulatory agencies and the general public in an open and honest manner.*
- *Identify the size and economic impact of the balloon ride industry in the United States.*
- *Develop an accurate database of US balloon operators and categorize by an appropriate measurement of size*
- *Develop ride operation training modules to be part of pilot and crew continuing education. Work with BFA Safety Seminar organizers to provide continuing education on a variety of topics including: ride safety, landowner relations, marketing, crew training, employee and independent contractor legalities, organizational structure, legal waivers, insurance and contracts.*
- *Provide information resources and assistance in dealing with crisis management.*
- *Work with the insurance industry to develop appropriate standards of flight experience (hours) by size of balloon*
- *Develop a list of weather criteria and guidelines to be considered for each flight to assist in go/no-go decisions.*
- *Provide guidance in understanding the complex legal and insurance matters relating to passenger waivers, acknowledgement of risk and release of liability vs. hold harmless clauses.*

- *Develop standards of passenger briefings and education relative the risks associated with balloon rides.*
- *Develop an interactive web site (as part of the BFA web site) to promote members of PRO adhering to its principles and guidelines advocated to improve public safety. Provide a list of commonly asked questions and information on how to select a reputable balloon ride operator.*
- *Provide guidance to assist large ride operators in instituting drug and alcohol testing for all pilots carrying passengers for hire*

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Chapter 1

Overview

The following pages will identify and address several areas all in the field of hot air balloon rides in the United States. There will be many different opinions and perspectives on the items discussed. The idea of change at times may be difficult, but may be long overdue and necessary if the industry is to sustain itself in the long run.

These Industry Best Practices Guidelines have been developed to create a working, informative and educational resource for the industry and regulatory agencies. In order for that to be achieved, the industry has a unique opportunity to have a say in creating these Guidelines as well as to create consensus and present a unified approach and solution to industry safety concerns.

Chapter 2 contains our membership standards while the remaining chapters deal with details to educate and provide resources for the ride operator to enhance safety and professionalism for the hot air balloon operator.

Specific recommendations supported and endorsed by PRO are as follows:

- ***Establish Best Practices Guidelines to assist both large and small ride operators in developing a business operations manual outlining their specific operating procedures developed to ensure well-trained pilots, maintenance of equipment to the highest of standards and a vetting process for paid passengers to help ensure they possess the physical requirements for a balloon ride.***

- ***Individual ride operators must develop specific weather parameters for safety given their operations area. Every operator should have written parameters related to wind speed at the surface as well as altitudes of 1,000' AGL and below. Proximity of thunderstorms and the presence of convective activity should be quantified. Acceptable ceilings and visibility should also be quantified in the business operations manual.***

- ***Operators must develop waivers and releases of liability for passengers, which have been reviewed and developed by legal counsel from their operations area. Passenger briefings must be thorough and explain the risks involved as well as discuss the provisions of the waiver well in advance of the balloon inflation***

- ***Continuing education must be paramount to all pilots flying passengers for hire. Strict adherence to standards of currency established relative to the operators specific operations must be part of the ride operator's culture. Pilot currency requirements must be held to a higher standard than CFR §61.57 for pilots engaged in carrying passengers for hire. In addition, flight reviews should be established that are more stringent than that required by CFR §61.56.***

- ***A system of peer review should be established for large operators carrying more than 500 passengers per year. The PRO should establish an approved list of pilots and operators approved to perform peer reviews based on standards established by the industry.***

Chapter 2

PRO Member Qualifications and Standards

PRO Members adhere to the Best Practices and demonstrate adherence through an auditable safety/operations manual.

This publication contains a significant amount of resource information designed to assist the ride operator develop his operations manual. This Chapter summarizes the standards advocated by PRO.

2.1 Management

Company management will establish and enforce standards to insure that safety is the primary consideration for hot air tour operations. These standards include avoiding any perception of a thrill ride, aerobatics, excessive contour flying or unnecessary abrupt maneuvers. PRO also calls for the establishment of a Safety Management Program that includes outside, professional safety management courses, e.g. BFA Safety Seminars for each member company's owner/operator, pilots and crew as well auditable documentation. A safety plan comprises rules on work procedures, contingency plans and incident reporting.

Management also will establish clear flight operating standards and weather minimums to provide safe and consistent day-to-day operations. These standards will never compromise safety and the pilot(s)' professional judgment will be respected at all times.

Management will encourage coordination with other operators flying in the same air space. Regular meetings will be held to coordinate typical launch, flying, and landing areas, noise abatement, landowner relations and safety procedures.

All members of PRO must comply with all local, state and federal business requirements. This includes but is not limited to having adequate liability and personal property insurance, business licenses and/or registration as well as proper filing of all Federal, state and local tax returns. The PRO promotes and supports only good and ethical business practices that mean that compliance with ALL local regulations and registrations with authorities is required

2.2 Pilot Qualifications & Training

Minimum pilot experience thresholds set by balloon size (AX category).

Additional training also is required for Crew Resource Management, Aeronautical Decision Making, recovery from adverse weather conditions, aircraft performance planning (density altitude), emergency procedure training and passenger briefings.

2.3 Maintenance

- Comprehensive maintenance schedules and documentation.
- Key maintenance staff to attend manufacturer maintenance seminars.
- Owner/operators, pilots and crew must be familiar with the aircraft's Instructions for Continued Airworthiness and the review of that document must be part of an annual safety review.

2.4 Ground Support Personnel

Ground Crew training should include the following:

a) The crew member should be allowed an opportunity of training before being released to crew independently on a balloon
b) Crew training should include professionally speaking with passengers, inflation procedures, pack up procedures and emergency procedures
c) Crew should be encouraged to attend annual safety seminars

2.5 Ride Operator Equipment and Licenses

Operators must ensure the ongoing and effective maintenance and repair of all HAB equipment, vehicles, conveyances and facilities. Specific standards of compliance include the following:

Aircraft Requirements

The aircraft MUST be maintained to FAA requirements (or higher) and in line with the manufacturer's recommendations.

a) At all times MUST carry a valid Standard Airworthiness Certificate, Aircraft Registration and Flight Manual. It is the pilot's responsibility to ensure the air-worthiness of the aircraft before each flight, in line with the manufacturer's guidelines
b) All aircraft should be inspected under FAA guidelines by a certified and licensed FAA repair station (repair station information should be available upon request)
c) Fire extinguishers and first aid kits should be standard equipment in all aircraft
d) Ensure all laws and regulations relating to fire safety, public health and personal security (including but not limited to laws relating to harassment, vilification, unlawful conduct and personal trespass of all kinds) are adhered to as required by local city and state requirements
e) All Aircraft and or Aircraft parts should be listed on an inventory sheet with the following information; make (Cameron, Lindstrand, etc.) model, size, serial number, along with Standard Airworthiness Certificate, Aircraft Registration, Flight Manual and Aircraft Logbooks

Chase Vehicle and Trailer Requirements

a) All vehicle operators should have available upon request, all vehicle registration documents and required licenses
b) Records of maintenance checks and inspections must be kept. The records must show that each vehicle undergoes checks as required under local regulations
c) A motor vehicle insurance policy for each retrieval vehicle used should be current and not past the renewal date
d) The insurance policy should contain details of sums and parties insured
e) If trailers are used it should be adequately maintained, safe and legal for transporting the balloon
f) It is the driver's responsibility to ensure the trailer is correctly attached to the vehicle

Propane Requirements

a) All storage, transportation and refueling involving propane will be in line with DOT propane codes
b) All propane tanks should be listed on an inventory sheet with the following information; make, size, type of fitting (Cameron, Lind strand, etc.) serial number, inspection and expiration dates

Business License Requirements

a) The business must have a current license to operate issued by the relevant authorities if locale requires
b) A copy of all required licenses should be available upon request
c) Hot Air Balloon and Chase Vehicle Liability Insurance
d) The Operator must hold a current HAB and Chase Vehicle Liability Insurance policy
e) A copy of the HAB and Chase Vehicle liability insurance certificate should be available upon request and by the date of the annual insurance policy renewal in future years
f) The insurance should be current and not past its date of renewal

Pilots

a) It is the operator's responsibility to ensure that all pilots flying for the company hold a valid FAA issued LTA commercial pilot's license for flying the aircraft and for which an appropriate rating is held
b) The operator must ensure pilots meet with the FAA requirements
c) The operator should have on file all pilots' names, age, qualifications, licenses/ratings, total hours logged and experience of each type of aircraft
d) All pilots are required to attend a minimum of one BFA sanctioned safety seminar a year

Chase Vehicle Drivers

a) Operators must have in place a system for ensuring that they only employ or contract drivers who hold valid "driver's licenses" for the category of vehicle, which they will be driving
b) It is the operator's responsibility to ensure that these licenses are subsequently checked, and a copy taken and dated on a regular basis (at least annually)
c) Alcohol and substance abuse - Drivers should be made aware of the effects of alcohol and substance abuse. Drivers must not report for duty under the influence or partake during the shift
d) Drivers must be trained in the following:
    i. Emergency Procedures - covering passenger safety and traffic management in the event of fire, road traffic accidents etc.
    ii. Fire Prevention / Fighting
    iii. First aid provisions

Communications

There must be means by which the driver (or in the event of the driver being incapacitated, another adult) can raise the alarm in the event of an emergency. This could be by means of a radio or cell phone, which must be available, at all times when passengers are in the vehicle

2.6 Risk Assessment

Vehicle Emergency Procedures

a) There must be a documented emergency procedure for breakdowns and vehicle road accidents etc.
b) All drivers and relevant office-based personnel must have been trained in and/or have access to emergency document procedures. These procedures should detail action to be taken in the event of a vehicle breakdown, puncture or road traffic accident
c) First aid kits must be available in all vehicles

Fire Certification and Procedures

a) There should be a written fire procedure for customers and staff to follow
b) All staff must be trained in the fire procedure, including use of equipment and evacuation.
c) Documents should be available upon request to ensure that firefighting equipment and appliances are maintained in full working order

2.7 Incident and Accident Reports

An Incident and Accident report must be developed in conjunction with the contingency plan. The report must contain a description of all incidents, injuries and accidents, as well as incidents which might have led to an incident or accident. The incident report is seen as part of quality and safety management; that is, to indicate how services might be improved, dangers prevented, or other measures taken to ensure that an incident does not reoccur or that its consequences are minimized.

The incident reports should be used to reassess services, improve safety, risk assessment and, last but not least, contingency plans. Incident reports may reveal whether one type of service, flight area, wind direction is more likely to involve mishaps than another.

An incident report must be compiled for all the company’s flights, and it must be included in the documentation accompanying pilots and crew on all tours. A completed incident report shall be submitted as soon as possible to the person responsible for the company’s safety and quality matters.

Ride operators are required to maintain an accident logbook with full and comprehensive record of all accidents and injuries. This information should be kept for a minimum of three years and the information should be available upon request

2.8 Rules on Work Procedures

Written rules on work procedures must be compiled containing an outline of how the company implements its service, demands placed on staff regarding knowledge of local conditions of the flying area, the experience, knowledge and training of staff members, checklists, equipment lists, choice of launch areas and the provision of information to passengers and their families. Rules on work procedures must, for example, be in part based on risk assessment since they are intended to minimize or exclude dangers identified in the assessment.

2.9 Code of Ethics

The Professional Ride Operator's Division of the Balloon Federation of America has adopted standards for its members. Any member balloon ride company must have a reputation of integrity, honesty and trustworthiness. That strong ethical reputation is a vital asset. Each of us shares a personal responsibility to protect preserve and enhance it.

Owners, pilots, and crew will keep uppermost in their minds that the safety, comfort, and well being of the passengers who entrust their lives to them are their first and greatest responsibility. Specific standards follow:

Ride Operation Owner

- Owner will never impose any external pressures or personal desires to influence his pilots or ground crew, nor will he knowingly do anything that could jeopardize flight safety.
- Owner will conduct all his affairs in a manner that reflects credit on himself, his profession and the ballooning industry.
- Owner will go over the Code of Ethics in detail with every new employee or contractor. In addition, he must ensure that the Code of Ethics is reviewed as part of an annual training session. Employee and Contractor should be advised that failure to follow these rules is cause for termination.
- Owner will be truthful and accountable in all advertising.
- Owner will ensure all aircraft used in the operation are maintained in accordance with the Federal Aviation Regulations.
- Owner will ensure that all ground transport vehicles are in compliance with state and federal laws.
- Owner will not knowingly falsify any log or record, nor will he condone such action by pilots or crew.
- Owner will ensure his pilots have sufficient flight experience to safely operate the aircraft.
- Owner will ensure all of his pilots have current biennial flight reviews and have attended a BFA safety seminar and continuing education in the preceding 12 months.
- Owner will properly document and report incidents or accidents to appropriate authorities.
- Owner will annually provide a copy of insurance coverage on all aircraft and chase vehicles to the BFA/PRO.
- Owner will support landowner relations in a pristine and proactive way.

Pilot

- Pilot will never permit external pressures or personal desires to influence his judgment, nor will he knowingly do anything that could jeopardize flight safety and passengers.
- Pilot will remember that an act of omission can be as hazardous as a deliberate act of commission, and he will not neglect any detail that contributes to the safety of his flight, or perform any operation in a negligent or careless manner.
- Pilot will conduct all his affairs in a manner that reflects credit on himself, his profession and ballooning.
- Pilot will ensure that the aircraft is in an airworthy state prior to take off.
- Pilot will faithfully obey all lawful directives given by his supervisors, but will insist and, if necessary, refuse to obey any directives that, in his considered judgment, are not lawful or will

adversely affect flight safety. He will remember that in the final analysis the responsibility for safe completion of the flight rests upon pilot's shoulders.

- Pilot will not knowingly falsify any log or record, nor will pilot condone such action by other crew members.
- Pilot will present a detailed briefing to passengers prior to take off. The briefing will include landing instructions.
- Consistent with flight safety, he will at all times operate his aircraft in a manner that will contribute to the comfort, peace of mind, and well-being of his passengers, instilling in them trust in pilot.
- In event of an emergency, pilot will take whatever action he deems necessary to protect the lives of his passengers and crew.

Ground Crew

- Crew will conduct all his affairs in a manner that reflects credit on himself and his profession.
- Crew will respect landowners and their property when inflating or retrieving the balloon.
- The driver of the transport vehicle will not consume or be under the influence of alcohol while transporting passengers and obey all traffic laws.
- In event of an emergency, crew shall do whatever is necessary to protect passengers, pilot and crew.

2.10 Business Standards

The PRO recommends and endorses these business standards for its members.

Basic Business information available to public upon request:

- Business name, address and phone number
- Business owners name, address and phone number
- State Corporation information
- Business license information if required by local city or state
- Sub-contractors contact, business, corporation and license information should be on file with primary ride operator
- Company Insurance Information: HAB (Hot Air Balloon), chase vehicle and trailer liability insurance policy company name and address
- HAB, chase vehicle and trailer insurance policy coverage levels and time period of coverage
- Sub-contractors HAB, chase vehicle and trailer insurance policy information should be on file with primary ride operator

Aircraft Information:

- Copies of Standard Airworthiness Certificate, Aircraft Registration and Flight Manual
- Copies of Aircraft Log Book and maintenance records
- Company information performing last annual inspection
- Sub-contractors Aircraft Information (see Aircraft Information above) should be on file with primary ride operator
- Chase Vehicle and Trailer Information:
- Chase Vehicle and Trailer Registration/Maintenance Documents
- Sub-contractors Vehicle and Trailer information should be on file with primary ride operator

Pilot Information:

- Pilot's name, address (including sub-contractors)
- Copies of Pilot Certificate and last flight review (including sub-contractors) should be on file with primary ride operator

Ground Crew:

- Full and/or Part-time ground crew contact information
- Driver's License information for any ground crew operating chase vehicle
- Sub-contractors ground crew information should be on file with primary ride operator
- Ride Operator Service Guidelines

2.11 Ride Service Standards

Before providing services, products, accommodation, and venues are generally expected to:

- Ensure that all risks and potential hazards are clearly explained, and that all participants are fully briefed and have signed the necessary acknowledgements and releases before any activities are commenced. All briefings of participants should disclose and highlight any special risks or hazards posed by pre-existing medical conditions and should also highlight the level of physical fitness required to undertake an activity
- Ensure that all services, products, tours, excursions, activities, venues, accommodations and ancillary services are provided to the appropriate standards and that industry practices are followed to ensure the comfort, safety and security of all customers and guests
- Customer Acceptance Records/Waivers are signed and placed in chase vehicle before services are provided
- All customer signed Acceptance Records/Waivers kept for a minimum of one year or as required by your state from the date services were provided
- Air excursions by nature are potentially dangerous activities; all participants must be made aware of the risks involved. Participants should note that, although very remote, the risk of injury or even death still exists and they should not participate in the sport if they can't accept this fact
- The 'safety instructions customer acceptance form' (see Appendix Z) should be read and signed by each participant, either at the time of the sale or before the start of the trip, to ensure that each participant is aware that they should not take part if they have any medical condition which could be exacerbated by the trip
- In the interest of safety, participants MUST declare, in confidence, to the operator or pilot, medical conditions that could in any way affect them during the activities. The supplier should retain these records for as long as practicable
- Prior to the flight, customers must be instructed verbally of the operator's recommendations for clothing during the flight
- A written and verbal safety briefing should be given to all participants before the excursion commences. This must include all of the issues addressed in the safety instruction customer acceptance form and any additional items as required locally
- Advise passengers that cell phones should be turned off during flight
- Passengers under the influence of drugs or alcohol will not be taken on the flight
- All personal items carried MUST be secured before and during the flight to prevent any hazard
- The pilot should point out to all passengers the location of all emergency equipment on board
- The pilot should point out to all passengers how to enter and exit the balloon and actions to be taken in the event of an emergency

Chapter 3

NTSB - FAA Relationships & Issues

3.1 Introduction

One of the primary purposes of the BFA and PRO is to establish a working relationship with Federal Aviation Administration and the National Transportation Safety Board. Currently there is very little data available to determine the size of the Hot Air Balloon ride industry. Questions such as, how many ride operators are there? What is a ride operator? How many passengers are flown each year? What's the number of accidents/incidents that occur by ride operators?

These are all the type of questions that the ride operator industry must come together to answer as well establishing a database for regulatory officials and the industry.

3.2 NTSB

The National Transportation Safety Board is an independent Federal agency charged by Congress with investigating every civil aviation accident the United States and significant accidents in other modes of transportation – railroad, highway, marine and pipeline. The NTSB determines the probable cause of the accidents and issues safety recommendations aimed at preventing future accidents. In addition, the NTSB carries out special studies concerning transportation safety and coordinates the resources of the Federal Government and other organizations to provide assistance to victims and their family members impacted by major transportation disasters.

On April 7, 2014 the NTSB issued a letter to the FAA urging the FAA to take action on various safety recommendations related to perceived operational deficiencies in commercial sightseeing (air tour) balloon operations that have resulted in occupant injuries and a fatality. Two safety recommendations made by the NTSB are:

1. Amend CFR §91.147 to require commercial balloon operators to obtain and maintain a letter of authorization (LOA) to conduct air tour flights (A-14-011)
2. Through appropriate revisions to FAA Order 1800.56J (replaced by 1800.56O), "National Flight Standards Work Program Guidelines, "encourage principal operations inspectors to include in their general surveillance activities commercial balloon operators that hold letters of operation (LOA), especially upon initial issuance of the LOA and then as necessary, particularly if the operator is involved in an accident

This recommendation is a wakeup call for the BFA and, in particular, for every balloon ride operator in the United States. The primary purpose of these Guidelines for Excellence is to respond to this NTSB request in a proactive manner. The industry must establish standards based on its unique knowledge and experience or we will find ourselves on the outside looking in at regulations forged by many who are not familiar with hot air balloon operations.

3.3 FAA

The Federal Aviation Administration (FAA) is responsible for ensuring the safety of civil aviation; it functions as agency within the US Department of Transportation. The Federal Aviation Act of 1958 created the Federal Aviation Agency (FAA) and gave it broad authority to combat aviation hazards as well broad rulemaking power. In addition, the FAA has sole responsibility for developing and maintaining a common civil-military system of air navigation and air traffic control.

Today, the agency's mission is "to provide the safest, most efficient aerospace system in the world."

3.4 Public Safety – Everyone's Mission

We recommend that every ride operator familiarize themselves with provisions of CFR §91.147 and FAA Order 1800.56O (http://www.faa.gov/documentLibrary/media/Order/FAA_Order_1800.56O.pdf).
While the FAA is charged with the regulatory authority to regulate aviation toward the goal of safety for the general public, balloon ride operators have a legal and moral obligation to ensure that their operations are organized and run with the absolute highest regard for safety of passengers and the general public.

It will only be through tough self-regulation, education and adherence to industry standards developed by the most experienced balloon ride operators and other aviation safety experts that the tide of balloon accidents resulting in personal injury and death can be reversed.

The BFA and PRO are committed to fill the void of information in the industry and serve as a conduit from our industry to regulatory agencies. The single largest component of this relationship is to provide information that will achieve the goal of safety and accountability for the industry. It's only with BFA and PRO's pro-active participation that practical and reasonable rules and regulations will be promulgated by the FAA and NTSB.

Chapter 5

Pilot & Company Weather Parameters

5.1 Chapter Overview

The requirements of the Federal Aviation Regulations (FAR's) are clear in § 91.103, Preflight Action. In part it states: *"Each pilot in command shall, before beginning a flight, become familiar with all available information concerning that flight. This information must include . . . weather reports and forecasts, fuel requirements, alternatives available if the planned flight cannot be completed…"*

The responsibility to obtain a complete and thorough pre-flight weather briefing rests entirely on the pilot in command. However, to assist and facilitate pilots in this regard, balloon events have accepted the task of gathering and reporting the necessary weather information. There is a valid expectation among participating pilots that events will provide a thorough weather briefing as part of each pre-flight briefing. It is important that event officials, particularly the weather officer, are experienced at gathering the necessary information and evaluating its potential impact on balloon flight operations.

This chapter provides important considerations for event organizers, officials and pilots. Well run, safety-conscious events have built a reputation of recruiting experienced officials and allowing them to operate in an independent manner to ensure that pilots and crews receive the best and most current weather information to assist them in their responsibilities.

5.2 Passenger Expectations vs. Reality

5.3 Impact of Weather

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5.4 Weather Information

There are numerous sources of weather information; some are official aviation sources, most are not. The degree of valid information varies dramatically from very useful to dangerously incorrect. The availability of information also varies dramatically depending on the location of the proposed flying area. Sites near a large city are more likely to have several sources of reliable and representative information. Rural events may rely on nearby (sometimes at a considerable distance) stations and usually require considerable interpolation among a variety of potentially non-representative sources. The changing nature of weather requires continuous updates and a significant dependence on forecasts.

The most common official aviation weather sources, Flight Service Stations, are available via the telephone. These are based out of Ashburn, VA, Ft. Worth, TX, and Prescott, AZ and can easily be reached at 1-800-WX-BRIEF. The service is operated by Lockheed Martin Corporation and can provide up-to-date conditions and forecasts for most areas. The second common official source is the Internet-accessible Direct User Access Terminal Service, DUATS (http://www.duats.com). This source allows for identifying aircraft numbers or event particulars and provides in-depth information and expected conditions.

In addition to the official sources, a myriad of alternatives are available via the telephone and Internet. The BFA web site contains articles on weather as well as several sources of weather information available at:

http://bfa.net/index.php?option=com_content&view=section&layout=blog&id=11&Itemid=88889104

There are also web sites that are dedicated to the sport of hot air ballooning including:

- www.wunderground.com
- www.usairnet.com
- www.balloncast.com
- www.ryancarlton.com
- www.erh.noaa.gov/buf/bufkit/bufkit.html

While these are useful sources, they must be treated with care. Experience and knowledge will help in the understanding of the strengths and weaknesses of "unofficial sources".

It is important to distinguish between "reports" which define observed conditions and "forecasts" which provide predictions of future conditions. It is also important to understand "valid periods" for forecasts in order to interpret conditions over the expected period of flight. Weather is very dynamic and conditions can change very quickly. It is important to continuously monitor the situation throughout the flight period and be on the alert for significant changes.

5.5 Changing Weather

5.6 Establish Operator Policies Regarding Safe Weather Parameters

5.7 Tailor Your Weather Parameters to Your Area of Operations

5.8 Weather and Its Relation to Accidents

Wind Speed

High surface winds are probably the most prevalent weather condition that leads to or contributes to accidents. Launches in winds of nine to ten knots (about twelve miles per hour) can be challenging requiring experience and a well-developed pilot skill level. The probability of balloon system damage increases significantly with higher launch surface winds. Similarly, landings in winds above ten knots require extra care and larger landing areas. While some balloon manufacturers permit launches and landings with demonstrated surface winds up to fifteen knots, winds at this level or greater are cause for concern at balloon events as they could cause injury to passengers or pilots.

Oddly enough "light and variable" wind conditions also create unique hazards of their own. If the event is competition-based, it becomes difficult, if not impossible, to call meaningful tasks and remove the luck factor as much as possible. But for all flights, light and variable can be a risk because the balloon pilots have no ability to steer away from ground hazards toward suitable landing locations.

Winds are not always what they seem to the casual observer. It is important to know the wind conditions at all levels of anticipated flight. High winds at 200 feet above the surface can create problems to the pilot who is searching for a landing site. Major changes in wind speed or direction at various levels create shears, which increase risks related to changing altitudes. Wind shear typically accompanies temperature inversions where the wind speed and direction can be very different at the top of the inversion. The temperature inversion also impacts the balloon performance and flight characteristics. Surface winds can be very misleading. It is not uncommon to have virtually calm conditions on the surface yet have 10 to 20 knot winds just 200 to 500 feet above the surface. Further, the winds at 3,000 to 6,000 feet above the surface are usually much stronger and likely in different directions than those observed at the surface.

For evening flights, the event is often faced with breezes until an hour or two before sunset. Participants need to be cautioned to avoid long flights and to be aware of the likely potential of becoming becalmed just as sunset occurs.

Ceilings and Visibility
Low clouds can produce "ceilings" which add to the hazards of flight. Unless an event has a waiver in place to allow lower flying, the Federal Aviation Regulations require that aircraft stay more than 1,000 feet above the highest obstacle in a congested area. Fog and low ceilings present problems with doing that. In addition, the threat of low clouds or fog forming during flight present the special case of trapping aircraft in the air, unable to land safely because of poor visibility and the threat of hitting obstacles.

Turbulence and Instability
Besides high winds, the presence or potential of thunderstorms is probably the most ominous threat to safe flight. They create strong winds, substantial turbulence, and the possibility of severe precipitation and lightning. Their effect can be pronounced at distances even exceeding fifty miles. They may be preceded by convective SIGMETS issued by the National Weather Service or they may be identified by visual observations. In any event, they cannot be ignored and generally will result in cancellation of all flying activities.

Thunderstorms can produce outflows that can surge hundreds of miles away. Thunderstorm outflows can travel in any direction, but will be environmentally supported in the direction of the prevailing wind direction near the surface. This is one of the reasons it is imperative to pay close attention to nearby observations, especially upstream observations, based on the overall prevailing synoptic flow.

Three ingredients are needed for thunderstorm development: moisture, instability and lift. Moisture is naturally found across center sections of the country under the influence of a southerly wind originating in the Gulf of Mexico. Lift can come in all sorts of forms from a front to a disturbance in the upper sections of the atmosphere. Instability is measured in a variety of forms, but the most inclusive is called 'CAPE', or Convective Available Potential Energy. CAPE (see Glossary) is a measure of the instability in the vertical axis, ranging from 0 (completely stable) to over 5,000 J/kg (extremely unstable). Many times in the summer months, the atmosphere may be unstable but yet it is still flyable because there is a warm layer in the atmosphere (referred to as an inversion) that keeps thunderstorms from developing. The strength of this capping inversion is referred to as 'cin'. For values of cin less than 50 J/kg, it would take relatively little additional lift in the atmosphere to produce showers and/or thunderstorms. Values of cin between 50 and 100 would need some sort of strong forcing to allow thunderstorms to develop, while values of cin over 100 will likely keep thunderstorms suppressed. Typically, lift will originate near the surface in the late afternoon/early evening hours, where overnight thunderstorms may originate at some level aloft based on winds and moisture. This is why it is important to look at lift from many levels of the atmosphere and not just the surface, especially when preparing for a morning flight.

Thermals
There are differences related to morning versus evening flights. The most pronounced of these is the variability of wind patterns. Early morning hours, just after sunrise, are the most stable time for flying. In many areas winds will increase as the morning goes on. In the summer months, thermals, resulting in mild to significant turbulence, can arise one and one-half to three hours after sunrise depending on local terrain variables. Each event needs to determine the critical factors affecting flight in their area. Thermal development is closely related to topography and ground cover and begins to develop when the sun is at an angle of 30° or more to the surface. Angle of the sun profoundly affects location of thermals over hilly landscapes. As the sun strikes eastern slopes more directly than other slopes, thermals will develop more quickly in those areas. In the afternoon, they move to western slopes before they begin to weaken as the evening sun sinks toward the western horizon.

5.9 Weather Parameter Matrix

Balloon event officials are encouraged to develop and set acceptable minimum/maximum weather conditions based on knowledge of the local area and the unique local characteristics that impact weather development. The following table is presented only as food for thought. It is not presented as the correct or even endorsed minimum/maximum weather conditions to ensure flight safety.

Critical Weather Variable	Possible Range to Consider
Surface Wind Speed *(maximum)*	10-11 knots considering flight direction and landing areas available
Wind Speed 200'-400' *(maximum)*	12-14 knots*
Wind Speed 400'-600' *(maximum)*	15-17 knots*
Wind Speed 600'-800' *(maximum)*	18-20 knots*
Ceiling *(minimum)*	1,500' – 2,000' (must also consider Airspace Class and § 91.119)
Visibility *(minimum)*	2-3 miles (must also consider Airspace Class and § 91.119)
Upwind Thunderstorm Proximity	50–100 miles depending on storm stage, intensity, frontal or air mass
Downwind Thunderstorm Proximity	30–50 miles depending on storm stage and intensity
Maximum Flight Time After Sunrise	1½-3 hours depending on topography, season and other local variables
Minimum Flight Time Before Sunset	¾-1 hour depending on direction and potential landing sites

Important Considerations
Establishing hard and fast parameters for ride operators to use in their weather evaluation and go/no-go decision is extremely difficult. Weather and flying areas in the US involve variables (topography, seasonal, population density, congestion, etc.) that greatly impact the appropriate parameter that should be applied at any particular balloon event. **The above table should be used with a great deal of caution and is presented only as an example of what every operator should develop on their own.**

Parameter Particulars to Ponder
Conventional wisdom generally considers ten knots as an upper limit to demonstrated surface winds. Sometimes, and in some areas, that limit may more appropriately be eight knots or as high as twelve knots depending on the possible wind breaks afforded at the particular launch field. The surface wind speed should be evaluated not only for launch but also for landings considering the size of potential landing areas given the direction of flight.

*Wind speeds in the two to eight hundred foot level above the surface are critical to the weather analysis because they strongly influence surface landing speeds. A balloon on approach for landing is descending through these higher-speed layers and requires time and distance to 'burn off' the higher speeds prior to landing. Depending on the wind speed differential, low level sheers can be present and create landing challenges for low-hour as well as experienced pilots. Wind shears can be represented by rapid changes in direction and speed differentials of ten knots or more. In addition to the maximum wind speeds depicted in the table above, attention must be paid to high levels of wind speed differentials occurring between layers.

Low level jets are a phenomenon that periodically impact balloon events in the Central Plains and are periodically experienced in many other areas of the US. These jets contain very high wind speed at several hundred feet above the surface with very moderate surface winds. The unique property of a true low level jet is that the higher speeds do not mix-down to the surface. Determination of this weather condition is best left to the weather professionals but it does provide an example of a perfectly safe flight with wind speeds of 25 – 30 knots at 500' AGL and a stand up landing.

Ceilings and Visibility
For aviation purposes, a 'ceiling' is defined as the lowest layer of clouds reported as being broken or overcast, or the vertical visibility into an obscuration like fog or haze. Consider that CFR § 91.119 requires flight at 1,000' above the highest obstacle and the following Airspace Class distance below clouds. When operating under an FAA Waiver the altitude above the highest obstacle is 500'.

Airspace		Visibility	Cloud Clearance
Class G	1,200' or less above surface	1 mile	clear of clouds
	>1,200' above surface but <10,000' MSL	1 mile	500' below
	>1,200' above surface and ≥10,000' MSL	5 miles	1,000' below
Class E	≥10,000' MSL	5 miles	1,000' below
	<10,000' MSL	3 miles	500' below
Class D		3 miles	500' below
Class C		3 miles	500' below
Class B		3 miles	clear of clouds

Given the above, the absolute minimum ceiling is 1,500'. Conventional wisdom would generally dictate a minimum ceiling of at least 2,000' with a preference leaning toward 2,500' or more.

Referring to the FAR's and requirements of the various airspace classes may permit some flights with visibility as low as one statute mile but that would be strongly discouraged for passenger flight operations. Two miles can be an acceptable minimum visibility but the operator and pilots must consider if they are flying into the sun. Straight line visibility of two miles may only provide for one and one-half or less diagonal visibility as required in balloon flight. The generally accepted minimum visibility for balloon flight is two to three statute miles. Selecting the correct minimum requires careful analysis of the above variables.

VFR Weather Minimums
Ride operators and pilots must be aware of basic VFR weather minimums. These are outlined in CFR §91.155. No balloon flight should be conducted below the VFR weather minimums of § 91.155.

Thunderstorms
Setting up arbitrary standards relating to the required distance from a thunderstorm is a slippery slope. The number of variables is just too significant. Upwind thunderstorms must be treated with utmost respect. Trying to squeeze in a short flight before an incoming thunderstorm is not wise.

Pilots are encouraged to work closely with weather professionals in making real time decisions with any thunderstorm within a radius as large as 200 miles depending on movement direction, speed and heights...

Chapter 6

Legal and Insurance Issues

6.1 Contracts and Agreements

Nothing in this section is to be perceived as advice or recommendation of legal counsel. As in any business there are local and state differences from place to place. The engagement of an attorney to discuss any particular agreement is recommended and encouraged. The need for a written agreement allows for a true expectation of what to be accomplished and expected from each party involved. In the agreement, items that should be addressed include date, time, services provided, cost, payment terms and dates clearly spelled out. As well, given the weather sensitivity of ballooning, a weather clause that identifies show up fees, cancellation and refund policy should be included in any ride operator agreement, marketing material or web site. This will allow for issues or discrepancies to be addressed in advance for both parties benefit.

Many companies or individuals that hire a balloon ride operator are not familiar with or may have never hired this service. It is the sole responsibility of the operator to identify and address these items. The professional operator's responsibility needs to take an educational approach to possible clients/customers. This will allow for a reasonable expectation of services provided, cost and weather and safety issues.

In the day and age of everything on line there are many passenger agreements that will be transmitted to operators electronically. Operators must ensure that they review and understand these documents as they are most often legal binding agreements. Take them seriously.

See Appendix A for an example of information presented to potential passengers.

6.2 Liability and Property Insurance

Pilot experience is the most important factor used by underwriters in pricing and providing insurance for balloon ride operations. Operators must evaluate hours in type and size of balloons when hiring pilots for ride operations. Every ride operation should subscribe to a peer review process that ensures proper pilot training and review of the needed skill set. The basic FAA requirements of §61.56 provide the minimum standard but it is the belief of experienced large operators that an annual review is more appropriate. The PRO is committed to investing in continuing education for ride operators and the industry.

Even though there is no local, state or federal requirement for insurance on hot air balloons, it is a requirement to become a member of PRO. It is the position of PRO that in order to be taken seriously as a professional ride operator that adequate liability and property damage insurance must be carried. There are a couple of underwriters for balloon ride liability insurance. Typical coverage includes $100,000 per person coverage with $1,000,000 per occurrence. Higher limits may be available with different companies.

In today's world these limits are do not begin to cover claims from a serious personal injury. It is highly encouraged that an operator seeks the highest amount of coverage that is possible for balloon insurance.

6.3 Vehicle Insurance

This is usually mandated by local law and is required in all states. It is the type of insurance that all operators would have. There are many limitations of using personal insurance for commercial activities. There have been cases of claims being denied for commercial work on personal policies. Statistically speaking it is much more likely that there is a chance for vehicular accident than an

aviation accident. Coverage comes in different limits and types. PRO highly recommends $1,000,000 minimum coverage for commercial operations.

PRO members are required to have the appropriate coverage for vehicles per state requirements to be a member in good standing.

6.4 Workers Compensation

Once again all states have different laws, please consult for exact coverage required in your area of operations. All employees must be covered by workers compensation as a PRO member.

6.5 Waivers, Indemnifications and Release of Liability

Managing risk is of the utmost importance to sustain our industry. When loss experience is not reasonable in comparison to premiums collected, one of three things must happen: rates increase, insurance coverage is cancelled or, worse yet, no longer made available to a very small industry. It is everyone's responsibility to invest in safety thereby minimizing risk and losses in order for underwriters to continue to provide insurance coverage for our operations.

Over the past decade the insurance companies have imposed requirements to support and assist the industry to manage risk with minimum pilot hour requirements, the use of passenger waivers, etc.

There are many terms used in the business of managing risk. Here are the principal ones along with a general definition. You are cautioned to seek local legal counsel to assist in drafting and reviewing any documents used in this regard.

Waiver and Release of Liability: A waiver or release gives up a right, such as releasing one from his/her liability for harm or damage that may occur from performing under a contract, or participating in an activity. Some activities are considered inherently dangerous, and those who participate in such activities may be required to sign a release form, acknowledging that they are assuming the responsibility for their voluntary participation in such activities. The release acts as an assurance to the person requesting the release that they will not be subjected to litigation resulting from the signing party's informed and consensual acts. Waivers and releases would only be construed as valid in the case of ‘ordinary’ negligence.

Indemnification: Indemnification is the act of making another "whole" by paying any loss another might suffer. This usually arises from a clause in a contract where a party agrees to pay for any losses which arise or have arisen. Insurance policies are indemnity contracts.

6.6 Municipal Regulations

Many local municipalities have enacted regulations that might impact balloon ride operations. Examples might include restricted or limited areas of operation, operating licenses, fees, etc. Operators should seek legal counsel to determine if there are any such restrictions in their area of operation.

Operators must be careful to always be respectful of landowner property and relationships. An irate landowner going to city council to complain about low flying balloons may be all that is necessary for someone to think regulations prohibiting balloon operations is needed.

6.7 Employees vs. Independent Contractors

Large ride operators may hire independent pilots to fly balloons for their operation. If a hired pilot is flying balloons owned by the ride company and the company has direct control over their schedules and the work is regular over an extend period of time, the relationship is probably employer-employee. On the other hand, pilots engaged to fly for a ride operator at a specific event and they provide their own balloon and related equipment, i.e. Fiesta, they would be considered an independent contractor.

This is an important legal distinction from both a legal and employment tax point of view. Ride operators should consult with legal counsel as well as their tax advisor to assist in this determination as well as any required documentation.

What is an independent contractor?
We can look in three different places when answering this question. A sometimes difficult status to define, what makes an independent contractor has been outlined by common law principles, the Fair Labor Standards Act, and finally the decisions of some courts.

The IRS and many states have adopted common law principles to define an independent contractor. These rules focus primarily on the level of control an employer has over a service or product, meaning, whether or not the employer actually defines what is being done and how it will be accomplished.
Common law principles further define independent contractor status by method of compensation. If a person is on an employer's payroll and receives a steady paycheck, clearly that the person is an employee rather than an independent contractor, who likely receives payment in a different manner. Other considerations when identifying someone as an independent contractor may include:

- If the worker supplies his or her own equipment, materials and tools
- If all necessary materials are not supplied by the employer
- If the worker can be discharged at any time and can choose whether or not to come to work without fear of losing employment
- If the worker controls the hours of employment thus indicating they are acting as an independent contractor
- Whether the work is temporary or permanent

Again, the nature of the work will help define the relationship. When work is considered integral to the business, it is more likely that the person is an employee. On the other hand, work that is temporary and non-integral may imply independent contractor status.

In an attempt to interpret provisions of the Fair Labor Standards Act and discern between employee and independent contractor status, some courts and federal agencies have come up with the "economic realities test." It looks at the dependence of the worker on the business for which he or she works. If a person gains a large portion of their salary from that business, chances are that person qualifies as an employee. The test also factors in such things as level of skill, integral nature of the work, intent of the parties and payment of social security taxes and benefits.

Outside of the Fair Labor Standards Act, courts ask the following questions to determine work relationship in addition to both an economic and an agency test:

- What is the degree of control over work and who exercises that control?
- What is each party's level of loss in the relationship?
- Who has paid for materials, supplies and/or equipment?
- What type of skill is required for work?
- Is there a degree of permanence?
- Is the worker an integral part of the business?

These courts also use the "right to control" test. When the hiring party controls the way work is carried out and a product is delivered, the relationship between the parties is employer/employee. If an employer does not have authority over how a party accomplishes his or her work but simply give requests an outline, the relationship between the parties is that of hiring party/independent contractor.

Employer Tax Liability
An employer's tax liability is determined by the worker's employment status. When a worker is an employee, employers must pay state and federal unemployment tax, social security tax and workers compensation/disability premiums to a State Insurance Fund. When a worker is an independent contractor, the hiring party is not required to make any of these payments.

6.8 Should employers incorrectly define a worker as an independent contractor, they may find themselves liable for past taxes including FICA and federal unemployment tax. Safe harbors which allow employers to use the independent contractor status and avoid penalties include: prior practice of treating similar employees as independent contractors and the existence of a prior IRS audit where no taxes were required to be paid.

6.9 PRO Standards

All members of PRO must comply with all local, state and federal business requirements. This includes but is not limited to having adequate liability and personal property insurance, business licenses and/or registration as well as proper filing of all Federal, state and local tax returns. The PRO promotes and supports only good and ethical business practices that mean that compliance with ALL local regulations and registrations with authorities is required.

Chapter 7

Passenger Registration and Vetting

7.1 The Need to Gather Information

In order to manage risk from an insurance and business perspective passenger management and vetting is absolutely critical. Taking grandma on a flight after a recent hip replacement may seem the perfect answer to her bucket list but it may be an invitation to disaster. While our sport generally provides a smooth and serene ride, ride operators are aware of the inherent risks involved in any flight. Passengers must possess a certain level of physical ability in order to minimize the risk of injury.

On-line reservations and passenger bookings must include some amount of questioning regarding the prospective riders general health, age, mobility restrictions, conditions that may lead to vertigo or any additional conditions important to the ride operator.

7.2 Passengers Under the Influence of Drugs or Alcohol

7.3 Passenger Briefings

7.4 Passenger Record Retention

Chapter 9

Pilot and Crew Qualifications

9.1. Chapter Overview – Ensuring a Culture of Safety

8.1 Pilot Recruiting and Vetting

8.2 Pilot Currency

8.3 Pilot Safety Training

8.4 The Flight Review

8.5 Instilling a Culture of Safe Operations in the Ride Operator Organization

8.6 Drug Testing

Chapter 12

Pilot Decision-Making and Risk Management

12.1 Chapter Overview

This publication contains a wealth of information for ride operators and pilots aimed at improving their decision-making process toward a goal of safer balloon ride operations. In the final analysis, however, safety starts and ends with the pilot in command. The FAR's are clear on this; all decisions concerning the flight, balloon system, crew and passengers are solely the responsibility of the PIC. This Chapter is designed to assist pilots in their event decision-making process and assessment of risks inherent in event flying. Much of the information presented is from the FAA publications *Balloon Flying Handbook*, FAA-H-8083-11A and *Risk Management Handbook*, FAA H-8083-2. After the technical discussion presented on pilot decision-making and risk management, practical advice is offered for pilots dealing with the realities of event flying in 10.6 and 10.7.

According to National Transportation Board (NTSB) statistics, in the last 20 years, approximately 85% of aviation accidents have been caused by "pilot error." Many of these accidents are the result of the tendency to focus flight training on the physical aspects of flying the aircraft by teaching the student pilot enough aeronautical knowledge and skill to pass the written and practical tests. Risk management (critical in regards to event flying) is ignored, with sometimes fatal results. It is estimated that 90% of balloon accidents are human factors related.

A key element of risk decision-making is determining if the risk is justified. The risks involved with flying are quite different from those experienced in daily activities. Managing these risks requires a conscious effort and established standards (or a maximum risk threshold). Pilots who practice effective risk management have predetermined personal standards and have formed habit patterns and checklists to incorporate them. If the procedures and techniques described in this Chapter are taught and employed, pilots will have tools to determine the risks of a flight and manage them successfully. Pilots who make a habit of using risk management tools will find their flights considerably more enjoyable and less stressful for themselves, their crew and passengers.

12.2 Aeronautical Decision-Making

This section discusses Aeronautical decision-making (ADM) as a systematic approach to the mental process used by pilots to consistently determine the best course of action in response to a given set of circumstances.

12.3 Risk Elements

This section discusses the FAA publication *Risk Management Handbook* (FAA-H-8083-2) and its use for balloon operations.

Balloon Risk Factors: What limitations will the aircraft impose upon the flight? Ask yourself the following questions:

1. Am I familiar with and current in this balloon? Balloon performance figures and the flight manual are based on a new aircraft flown by a professional test pilot (manufacturer), factors to keep in mind while assessing personal and balloon performance.
2. Is this balloon's required equipment on board and fully functional?

3. Are the navigation and communication equipment adequate?
4. Can this balloon carry the planned passenger load?
5. Does this balloon have sufficient fuel capacity, with reserves, for the planned flight? Up to two hours?
6. Is the fuel quantity correct? Did I check?

Environment Risk Factors: What environmental factors can influence the risks associated with balloon flight?

Weather: Weather is a major environmental consideration. As pilots set their own personal minimums, they should evaluate the weather for a particular flight by considering the following:

1. What are current and forecast surface and winds aloft? Does the flying area provide for adequate landing sites given the expected surface winds?
2. What is the current ceiling and visibility? In mountainous terrain, consider having higher minimums for ceiling and visibility, particularly if the terrain is unfamiliar.
3. Consider the possibility that the weather may be different from forecast. Have alternative plans and be ready and willing to land should an unexpected change occur.
4. If flying in mountainous terrain, consider whether there are strong winds aloft. Strong winds in mountainous terrain can cause severe turbulence and downdrafts and be very hazardous for balloons even when there is no other significant weather.
5. Are there any thunderstorms present or forecast? Be sure to look upwind.
6. What is the temperature-dew point spread? Are visibility levels likely to deteriorate?

Terrain: Evaluation of terrain is another important component of analyzing the flight environment. To avoid terrain and obstacles, especially in low visibility, determine safe altitudes in advance by using the altitudes shown on visual flight rules during preflight planning. When flying in mountainous and valley areas consider morning wind drainage, potential for increased wind speeds and box winds available for steering.

Landing Areas: Consider the following landing environmental factors.

1. Does the flight area encompass plentiful landing areas considering the anticipated flight direction and duration?
2. Review maps for PZ's and plan flight path and profile accordingly.

Airspace: Will the flight take place in proximity to controlled airspace? The following should be considered:

1. If flight operations are in the vicinity of airspace requiring two-way communication, are aircraft radios on board and functional?
2. Maintain awareness of congested areas and flight altitudes required by the FAR's or the event Waiver.
3. Check the airspace and any temporary flight restrictions (TFR's) along the route of flight.

External Pressures Risk Factors: External pressures are influences external to the flight that create a sense of pressure to complete a flight - often at the expense of safety. Factors that can be external pressures include the following:

1. Someone waiting at the launch field for the return of the passenger
2. A passenger the pilot does not want to disappoint
3. A paid ride excursion with a significant financial reward
4. The desire to demonstrate pilot qualifications
5. The desire to impress someone (probably the two most dangerous words in aviation are "Watch this!")
6. Desire to satisfy a specific personal goal
7. A pilot's general goal-completion orientation
8. The 'lemming' effect. "It looks like everyone else is flying; I'm sure I can handle this wind."
9. The emotional pressure associated with acknowledging that skill and experience levels may be lower than a pilot would like them to be. Pride can be a powerful external factor.

The desire to impress someone can be a powerful external pressure, especially when coupled with the internal pressure of pride. Perhaps the pilot decided to perform a maneuver not in his training profile (high wind landing), or one in which he had not demonstrated proficiency (controlled rapid descent). It is not uncommon to see people motivated by external pressures who are also driven internally by their own attitude. Management of external pressure is the single most important key to risk management because it is the one risk factor category that can cause a pilot to ignore all other risk factors. External pressures place time-related pressure on the pilot and figure into a majority of accidents.

The use of personal standard operating procedures (SOP's) is one way to manage external pressures. The goal is to supply a release for the external pressures of a flight. These procedures include, but are not limited to:

- Allow time on a flight to make an unexpected landing because of weather.
- Manage passenger expectations. Ensure passengers know that they might not return on a firm schedule nor may the flight be for a known duration.

12.4 Resource Management

Resource Management may be defined as "the art and science of managing all resources (both from on-board and external sources) available to the pilot prior to and during flight to ensure the successful outcome of the flight." Virtually all ballooning is done as a single-pilot operation; there is no "crew resource" available from the perspective of having a co-pilot to assist in workload management.

For any single pilot, the primary emphasis is to integrate the underlying thinking skills needed by the pilot to consistently determine the best course of action to take in response to a given set of circumstances. Resource management integrates the following concepts:

- Human Resources
- Risk Management
- Situational Awareness
- Training
- Decision-Making Process

Human Resources

Balloons differ from general aviation aircraft in the balloon pilot's reliance on diverse human resources for flight. Human resources include all groups working with pilots to ensure flight safety. A safe balloon flight includes, but is not limited to, a crew chief and ground crew, weather briefers, volunteers, spectators, "locals" with current and often unpublished information on roads and landing sites, landowners, and others who contribute assistance or information. Balloons differ from airplanes in their reliance on unlicensed, non-FAA-certified/recognized, and even first time volunteers to assemble and support ground handling of the balloon. Crew action - or inaction - at any stage of flight can contribute as much or more to flight safety than pilot input. Balloon flight safety often relies on many people beyond those onboard.

For example, a routine inflation on most balloons requires several sets of hands; moderate winds can quickly mean more help is needed. Having someone to handle a drop line offers a pilot landing site options inaccessible through onboard maneuvering. Added weight or "hands on" allows a pilot to choose a smaller landing site than when landing unassisted, or it can mean avoiding trees, power lines, or other obstacles.

Crewmembers can make important information contributions to flight safety because crew can access real time flight related information before a pilot. For example, precipitation is often visible on the chase vehicles long before it compromises a balloon's in-flight performance or gains a pilot's attention. The crew can also warn a pilot who is contour flying into the sun of power lines downwind or of livestock behind trees or buildings. A crew report on the current state of variable surface conditions can alert a pilot who is descending or landing into winds different from those of launch or flight. Crew action can easily mean the difference between a safe flight and an accident.

The essential and decisive roles crew and other human resources play in ballooning also create an ironic dilemma/dynamic between legal and operational realities. 14 CFR § 91 requires a pilot to act as the sole and final authority regarding operation of the balloon, yet every pilot must rely on crew who

are not trained, certified, or even recognized by any governing body for a flight to occur. Each pilot thus requires and leads this integral, yet legally invisible team on each flight. Overlooking, minimizing, or dismissing the crew's role opens the door to mishaps. Safety often lies in recognizing how the crew's skill, knowledge, and experience complement and enhance the pilot's own. While all final decisions and the responsibility for safety still rest with the pilot, this broader than usual resource model recognizes the human resources upon which every pilot relies for safe flight planning and decision-making.

Risk Management

Flying involves risk. To stay safe, a pilot needs to know how to judge the level of risk, how to minimize it, and when to accept it. During each flight, decisions must be made regarding events that involve interactions between the four risk elements discussed in 10.3 - the pilot in command, the aircraft, the environment, and external pressures. One of the most important decisions a pilot in command makes is the go/no-go decision. Evaluating each of these risk elements can help a pilot decide whether a flight should be conducted or continued.

Assessing Risk

Every flight has hazards and some level of risk associated with it. Pilots must recognize hazards to understand the risk they present. Knowing that risk is dynamic, one must look at the cumulative effect of multiple hazards (error chain effect) facing us. It is critical that pilots are able to:

- Differentiate, in advance, between a low-risk flight and a high-risk flight (perhaps based on pre-established check-lists or a personal decision matrix).
- Establish a review process and develop risk mitigation strategies to address flights throughout that range.

For the pilot with an experienced flight crew, input from various responsible individuals cancels out any personal bias or skewed judgment during preflight planning and the discussion of weather parameters. The single pilot, operating in a vacuum, does not have the advantage of this oversight. If the pilot does not comprehend or perceive the risk, he will make no attempt to mitigate it. The pilot who has no other crewmember for consultation needs to be aware of hazardous conditions that can lead to an accident. Therefore, he has a greater vulnerability than a pilot with a full experienced crew.

Assessing risk is not always easy, especially when it involves personal quality control. For example, if a pilot who has flown morning and evening flights for three days in a row awakes to yet another event flying opportunity, he will generally agree to continue flying. Pilots often discount the fatigue factor because they are goal oriented and tend to deny personal limitations when asked to continue.

Several risk assessment models are available to assist the pilot in determining his risk before initiating a flight. The models, all taking slightly different approaches, seek the common goal of assessing risk in an objective manner.

Quantifying Risk Using a Risk Matrix

The most basic tool is the risk matrix. It assesses two items: the likelihood of an event occurring and the consequence of that event.

Likelihood of an Event

Likelihood is nothing more than taking a situation and determining the probability of its occurrence. It is rated as probable, occasional, remote, or improbable. For example, a pilot is flying a morning Fly-In flight and there is currently no fog in the area but temperature/dew points are within 1° F. The Event Director has given the OK to launch based on an improving forecast. The likelihood of encountering potential MVFR or IFR conditions is the first question the pilot needs to answer. The experiences of other pilots coupled with the forecast might cause the pilot to

assign “occasional” to determine the probability of encountering visual obscurations. The following are guidelines for making assignments.

- Probable - an event will occur several times.
- Occasional - an event will probably occur sometime.
- Remote - an event is unlikely to occur, but is possible.
- Improbable - an event is highly unlikely to occur.

Severity of an Event

The other item in the matrix is the severity or consequence of a pilot’s action(s). It can relate to injury and/or damage. In the example above, what are the consequences of encountering inadvertent IFR conditions? In this case, because the pilot has no IFR capability, the consequences are potentially catastrophic. The following are guidelines for this assignment.

- Catastrophic - results in fatalities, total loss
- Critical - severe injury, major damage
- Marginal - minor injury, minor damage
- Negligible - less than minor injury, less than minor system damage

Simply connecting the two factors as shown in the Risk Assessment Matrix indicates the risk is high and the pilot should not fly, or fly only after finding ways to mitigate, eliminate, or control the risk. In this case, the pilot should wait to launch for an appropriate amount of time after sunrise to ensure that ground fog is unlikely to form. Although the matrix provides a general viewpoint of a generic situation, a more comprehensive program can be made that is tailored to a pilot’s event flying. A more comprehensive matrix could include a wide array of aviation related activities specific to the pilot and assesses health, fatigue, weather, capabilities, etc. The scores are added and the overall score falls into various ranges, with the range representative of actions that a pilot imposes upon himself.

Mitigating Risk

Risk assessment is only part of the equation. After determining the level of risk, the pilot needs to mitigate the risk. For example, the pilot flying in potential marginal flight conditions has several ways to reduce risk:

- Wait for the weather to improve to good VFR conditions.
- Delay the flight.
- Cancel the flight and go to breakfast.

Situational Awareness

Situational awareness is the accurate perception and understanding of all the factors and conditions within the four fundamental risk elements that affect safety before, during, and after the flight. To maintain situational awareness, a pilot needs to understand the relative significance of these factors and their future impact on the flight. When a pilot is situationally aware, he or she has an overview of the total operation.

Some obstacles to maintaining situational awareness include (but are not limited to) fatigue, stress, and work overload; complacency; and classic behavioral traps such as the drive to meet or exceed flight goals. Situational awareness depends on the ability to switch rapidly between a number of different, and possibly competing, information sources and tasks while maintaining a collective view of the environment. Experienced pilots are better able to interpret a situation because of their base of experience, but newer pilots can compensate for lack of experience with the appropriate fundamental core competencies acquired during initial and recurrent flight training. Pilot Resource Management training helps the pilot maintain situational awareness, which enables the pilot to assess and manage risk and make accurate and timely decisions. To maintain situational awareness, all of the skills involved in Aeronautical Decision-Making are used.

12.5 The Decision-Making Process

Understanding the decision-making process provides a foundation for developing the necessary ADM skills. Some situations, such as an extinguished pilot light, require an immediate response using established procedures. While pilots are well trained to react to emergencies, they are not as prepared to make decisions that require a more reflective response. The ability to examine any changes that

occur during a flight, gather information, and assess risk before reaching a decision constitutes the steps of the decision-making process.

Defining the Problem

Problem definition is the first step in the decision-making process. Defining the problem begins with recognizing a change has occurred or an expected change did not occur. A problem is perceived first by the senses and then is distinguished through insight and experience. This "gut" reaction, coupled with an objective analysis of all available information, determines the exact nature and severity of the problem.

Choosing a Course of Action

After the problem has been identified, the pilot must evaluate the need to react to it and determine the actions that need to be taken to resolve the situation in the time available. The expected outcome of each possible action should be considered and the risks assessed before deciding on a response to the situation.

Implementing Decisions and Evaluating the Outcomes

Although a decision may be reached and a course of action implemented, the decision-making process is not complete. It is important to think ahead and determine how the decision could affect other phases of the flight. As the flight progresses, a pilot should continue to evaluate the outcome of the decision to ensure that it is producing the desired result.

The DECIDE Model

A common approach to decision-making for the last decade has been the rational choice model. This concept holds that good decisions result when a pilot gathers all the information related to a particular scenario, reviews it, analyzes the options available, and decides on the best course of action to follow. The DECIDE Model, a six-step process intended to provide the pilot with a logical way of approaching decision-making, is an example of this concept. The six elements of the DECIDE Model represent a continuous loop process to assist a pilot in decision-making. If a pilot uses the DECIDE Model (see Risk Management Handbook, FAA H 8083-2, page 53) in all decision-making, it becomes natural and results in better decisions being made under all types of situations.

12.6 A Practical Approach to Pre-Flight Pilot Decision-Making

Pilot decision-making is a popular catch phrase referring to the myriad of decisions a pilot faces on every balloon flight. This Chapter has reviewed and provided professional guidance developed by the FAA on the broad subject of pilot decision-making. The overall purpose of the Ride Operator's Guidelines is, however, to provide guidance specifically related to hot air balloon passenger ride operations. The overall model of decision-making is not to be ignored but the following represent unique situations faced by ride operators. They should be considered carefully and integrated into the pilots skill set.

Let's consider for a moment what is different or potentially different when flying paid passengers. Here are some common passenger ride occurrences and they each create a unique set of variables that could impact our flying:

12.7 Personal Risk Assessment Model

While checklists can become burdensome, and every pilot has a unique skill set and experience level, the risk assessment model shown below serves as a great training tool. The model can and should be personalized with other variables as well as adjusting the numerical weights assigned to the variables. Various models for markedly different environments (i.e., fun flights vs. competitive or passenger flights) may also be developed. The important thing is to review the model and consider these variables when making go/no-go decisions.