

Balloon Event Guidelines

*For the safe and effective organization, management and
pilot decision-making at hot air balloon events.*



2nd Edition

Version 1.0

2018

BFA Mission

The Balloon Federation of America in 2010, under then President Don Edwards, championed the effort to create a document to assist event organizers and pilots to have the tools to run successful and safe balloon events for the enjoyment of all.

We encourage all organizers, pilots, crew and volunteers associated with hot air balloon events to join and support the BFA. It's through your support that we can carry on this valuable work.

We are proud to share our Mission, Vision and Values

The Balloon Federation of America is a membership organization dedicated to the art, sport and science of Ballooning, and to providing a unified voice for the purpose of representing U.S. balloonists and ballooning enthusiasts across the United States of America, its territories and possessions, before the international ballooning community.

The Balloon Federation of America will provide a national forum for the exchange of ideas to advance the cause of Ballooning as a safe activity that enriches not only the lives of those that directly participate, but the general public as well. In seeking to meet these objectives, the Balloon Federation of America will maintain the highest standards of excellence by promoting understanding and cooperation between ballooning disciplines, by establishing safety and training programs of value to all members, and by encouraging sporting activities that meet American values for fair and just competition.

Vision

The Balloon Federation of America is an open forum where all Balloonists may find support in achieving their dreams, excellence in their area of interest and assistance in reaching their goals. We envision all forms of Ballooning as a safe, family-oriented sport where all members may come to enjoy the art of aerostation and the wonder of flight. We support those competitors that come to ballooning for the thrill of winning.

We will serve as the Official Sanctioning body for the United States to the World's Ballooning Competition. We support all members that come to ballooning seeking community with others of like interest. We will continually strive to provide an environment that espouses Safety, Skill, and Achievement. We will seek an organization that provides enjoyment of ballooning all the while valuing basic human values of ethics, honesty and respect for all.

Values

- Safety is most important.
- We value human dignity.
- We support all common social values, respecting individuals and differing opinions.
- We seek all contributions to the sport of ballooning for the common good.
- We value education for all that seek knowledge in ballooning.
- We insist on fairness in all competitive events.
- We will recognize significant contributions to the sport and important achievements through individual endeavors.
- The affairs of the BFA will be administered in a democratic Forum with fairness, trust and integrity among the participants.

Disclaimer

This publication is designed to provide a consolidated source of recommendations and information on hot air balloon event organization and staffing as well as provide a source of safety information for pilots and crews in their decision-making process involving event flying. The information presented is intended to enhance safety by providing information and guidance for the three groups of event decision makers: Organizers, officials and pilots. 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 event organization 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 instruction. Pilots, Organizers and officials are strongly encouraged to learn as much as possible about this subject from other sources and tailor this information to meet the individual needs and nature of your specific event.

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, Organizer's and officials' experience, altitude flying and number of participating balloons as well as decisions made by individuals not directly involved with the flight are involved in the decision-making process of the event Organizer, officials and pilot. Risk levels can vary greatly among events, event Organizers, pilots and crews. 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 decision-making process of Organizers, officials and pilots at balloon events. 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 the Guidelines are comprehensive and cover a myriad of balloon event topics, this handbook intends to concentrate on one principal issue that permeates through many of our challenges – balloon event safety. In addition to event safety, this handbook contains a comprehensive set of suggested guidelines to be used by event Organizers, officials and pilots aimed at improving event organization and logistics. The publication contains a wealth of information for both the new and experienced and was developed and written for all involved in balloon events.

The Balloon Federation of America (BFA) has elected to take this proactive approach and establish a comprehensive set of guidelines that incorporates the critical aspects of organizing and officiating balloon events. It also provides many practical applications and sample forms to be used. This Balloon Event Guidelines Handbook presents the basic knowledge and skills essential for organizing and running a hot air balloon event using a well thought out decision-making model that places pilot and public safety first. The handbook analyzes the dynamics that occur when many balloons are flying at an event as well as many of the variables that affect the safety of all. Examples of the complex dynamics include the following:

- *Unfamiliar location and flying area*
- *Unfamiliar weather conditions caused by unfamiliar topography*
- *Unusual or excessive incentives to “put on a show”*
- *Group peer pressures or “lemming effect”*
- *Perceived or actual event and sponsor pressure*
- *Traveled too far to go home without at least one flight*
- *Pilot defense mechanisms (Aviation Instructors’ Handbook, FAA-H-8083-9A, 1-6 to 1-8)*
- *“Pilot discretion” flights*

The thoughts and opinions expressed in this Handbook are those of experienced event Organizers and event officials as well as pilots with extensive experience having flown at competitive, ride, and festival-based events across the United States. 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. This publication uses the term Balloonmeister as the individual charged with the responsibility for the safety and decisions of ground-based balloon activities and has operational control over all flight activity. At some events the Balloonmeister may also be referred to as the Event Director or Championship Director.

Acknowledgements

This handbook was produced under the auspices of the Balloon Federation of America and its ad hoc Balloon Event Guidelines Committee. We wish to acknowledge the following individual, corporate and government contributors:

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RE: Balloon Event Guidelines, 2nd edition

RPS IMC Balloon has had the honor of insuring hot air balloons for the past 30 plus years. Our mission has been the “protection of the sport of ballooning and all involved in this sport”. This goal cannot be achieved without mutually agreed upon safety procedures in place to better guide and protect the sport.

RPS IMC Balloon applauds the tireless dedication of effort, hard work and best intentions that are obvious in the creation of this valuable resource document. The collaboration of expertise by the committee members, pilots and the ballooning community as a whole has been no less than inspirational.

We are proud to endorse this excellent document, not only as an asset to the longevity of the sport of ballooning, but as a valuable resource tool. Events have the ability to reference all aspects of creating successful programs based on nationwide standards, for the ultimate goal of obtaining the maximum in safety for each and every event involved.

Congratulations on a job well done!

Fly safe!

Larry Konash

Gloria Keogh

Larry Konash –Balloon Agency Manager
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RPS IMC Balloon

Mission Statement & Goals

MISSION STATEMENT

*The Mission of The Balloon Event Guidelines Committee was to **update, develop and publish** a comprehensive reference source containing detailed information enabling Event Organizers and Officials to properly organize, plan and execute a balloon event with the safety of pilots, sponsors and the general public as the top priority.*

The publication was developed and written with pilots, officials and Organizers in mind and was prepared in a manner pertinent to sport, ride and competitive based events.

GOALS

The goals and objectives of this publication are many. The major goals of the BFA and the Balloon Event Guidelines ad hoc committee are as follows:

- *Improve the event decision-making process from the top down and provide useful tools to event Organizers and promoters to create a good decision-making model. The publication identifies the perceived safety issues and problems related to hot air balloon events and provides the information and tools to address them.*
- *Develop a comprehensive document providing detailed guidance to event Organizers, promoters, officials and pilots enabling them to organize and attend events utilizing the highest standards of safety.*
- *Establish guidelines of experience and performance for Balloonmeisters, safety officers and weather officials. Provide detailed job descriptions for event officials.*
- *Develop a list of criteria to be considered for each flight to assist in go/no-go decisions.*
- *Develop a method to assist events and pilots to understand what level of pilot experience is needed considering the variables inherent to an event. Develop concise guidelines of pilot proficiency related to attending balloon events.*
- *Develop a reference guide on 'how to' organize and run a safe and successful balloon event.*
- *Provide guidance in understanding the complex legal and insurance matters relating to passenger waivers, designated Flightcrew member acknowledgements, acknowledgement of risk, release of liability vs. hold harmless clauses, and additionally insured endorsements vs. certificates of insurance.*
- *Develop and recommend a methodology that encourages event Organizers and officials to follow the guidelines outlined in this publication.*
- *Work with and encourage the BFA and balloon insurance agencies to work in concert with one another to embrace this publication and take a proactive approach to disseminate this publication to event Organizers and officials and to promote this document as the industry standard.*

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Chapter 1

Overview



"We have met the enemy and he is us."
Walt Kelly

There is no surprise ending to this story. This handbook contains a comprehensive analysis of many factors affecting the organization of a safe balloon event organized and led by a qualified team of Organizers and officials experienced in analyzing a wide range of information and applying sound decisions based on safety.

The graphic above depicts the interrelationship of the three groups involved in hot air balloon events. Because of this interrelationship, this handbook contains information important to each of the three groups. While much of the pilot-based information can be found in other documents, it is the belief of the Committee that a consolidated source of information for all elements of event safety should be provided in the publication.

Anyone can read the materials and agree with the thought process but until we, the entire ballooning community, led by the Balloon Federation of America, add some structure and education related to balloon event organization and event complexity classification little will be accomplished.

The commitment to safety starts at the top and trickles down from there. It is the informed and experienced opinion of those contributing to this publication that many accidents could be avoided with better informed, experience-based, independent decisions made by Balloonmeisters and Organizers. Accidents can be significantly reduced if this top-down approach to reasonableness is adopted.

It must never be forgotten, however, that the decision to fly and all aspects of the balloon, launch, flight and landing, as well as the crew are entirely the responsibility of the pilot in command (PIC).

Specific recommendations we ask the ballooning community to adopt are as follows:

- *The BFA should establish guidelines of experience and background for all Balloonmeisters, not just for competitive events, but for all 'organized' balloon events soliciting pilot participation. Position descriptions should be developed based on these guidelines.*
- *Pilots deserve to know that the events they attend are implementing acceptable industry guidelines of safety and excellence regardless of the event's size or stature. We ask that balloon insurance providers encourage the use of the Balloon Event Guidelines and make available a digital version to all events requesting pilot insurance certificates or Additionally Insured endorsements. Events should promote, in pilot correspondence, their intended use of and adherence to the general principals promulgated as part of the Balloon Event Guidelines.*
- *A system of continuing education for all Event Officials should be established. A minimum of six to eight hours of this training would meet the periodic requirements of this training and we encourage the BFA Continuing Education Chair and insurance companies to accept this as qualifying for a pilot's safety seminar credit for balloon pilot liability insurance discounts. The BFA and its Regional Directors are encouraged to promote this training as a core element of safety seminars in their regions as well as encourage its promotion through the safety seminar sanctioning process. A list of qualified speakers should be developed for distribution to local balloon clubs sponsoring safety seminars.*
- *Event Organizers should have an Event General Liability (GL) insurance policy ("trip and fall"). While an Event Non-Owned Aircraft Policy would provide additional desirable coverage (on and off premises) the cost must be compared with that of additional insured endorsements.*
- *Pilots must develop their individual decision-making process considering the risk management requirements of balloon flight.*
- *Insurance companies should provide events with data that will enlighten them to hazards and allow events to address specific practices to reduce or eliminate accidents. Insurance providers are encouraged to perform a detailed statistical analysis of claims history related to accidents and incidents. One goal of the study is to help determine if there is a statistical relationship between pilot in command hours and the frequency of accidents or incidents. See Section 5.4 for details.*
- *This document should be monitored, reviewed and updated to reflect current technology, changes in Aviation Regulations and current thinking and experience in running a safe balloon event. The review should be done periodically but at least every three years and the BFA could use its Convention as the focal point in the review process.*

Chapter 2

Event Organization

2.1 Introduction

All event planning begins with determining the primary purpose of the balloon event and establishing the organizational structure to support the primary purpose. There are many facets to an event's organization but there are three primary areas of responsibility: the Organizer/sponsor; community safety services; and event balloon officials. The number of persons needed to organize and operate an event will, to a certain extent, depend on the size of the event, i.e., number of balloons participating and expected public attendance.

Events may be organized by Chambers of Commerce, charitable or not-for-profit organizations, or any independent individual or group. To be successful, the event Organizer should surround themselves with a technically experienced balloon pilot(s) capable of organizing a team (officials) and providing the event Organizer with all the technical advice and organizational expertise to safely run a quality balloon event (see Chapter 3 for details of needed experience). Both the event Organizer and officials will need the support of community safety forces to one degree or another.

While the event Organizer and officials must work closely together to succeed, there must be a clear separation of duties. Event officials must have the authority and ability to make independent decisions regarding all aspects of planned flight activities.

2.2 Event Organizer Responsibilities

Primary Responsibilities

The Event Organizer is responsible for all aspects of a balloon event. Organizers have a responsibility to participating pilots to plan for and provide a safe event as well as engage a team of event officials skilled at providing a safe environment including complete and thorough pre-flight briefings with complete and timely weather and safety information. This is not a responsibility to be taken lightly.

Event details requiring the Organizer's attention include the following:

Event Format

Balloon events fall into one of four primary categories: Festival, Competition, Ride-Based and a Combination. It is the responsibility of the Event Organizer to determine the event's format.

Festival Events are generally smaller events often organized for the purpose of flying in conjunction with a local civic event. Competition at festival-based events, if any, is very low key and would most likely only include hare and hound races. Participating pilots may have an obligation to fly a sponsor but there is no organized effort to solicit paid rides on behalf of the participating pilots. A prize fund may or may not be provided or there may be prizes donated by local merchants to be shared with the participating pilots based on low-key competition or perhaps the luck of the draw. This type of event is a good starting point for a community interested in starting a new balloon event and for pilots with limited event flying experience.

Competitive Events require specialized expertise from the officials' staff and the pilot base as pilot recruitment might be different than that for festival events. Competitive balloon races are comprised of single or multi-part 'tasks' governed by a rule book such as the one developed, approved and published by the Balloon Federation of America's (BFA) Hot Air Competition Division (HACD). Competitive events add a layer of complexity requiring specific expertise from the Balloonmeister. These events also require a large amount of specialized supplies and equipment including: scoring computer(s) with BFA scoring software installed, markers, targets, signals flags, rule books, basket banners, scoring and measuring

supplies, maps designed for competition, etc. Competitive events can range in complexity from moderate to extremely complex. An event wishing to declare a State, Regional or National Champion will be much more demanding on the Organizer and staff officials than a weekend event run to encourage or introduce new competitive pilots to the sport.

Ride-Based Events are similar to Festival Events but Organizers recruit and entice pilots to attend by offering paid riders. The event Organizer promotes the sale of balloon rides through a coordinated event ride concession. Pilots can generally earn money for each concession ride carried while the event keeps some amount from each passenger sale to help cover event expenses. Events may require each pilot to carry one paid rider for the benefit of the event before being compensated for additional riders. Events vary greatly in how they handle the details of paid riders, as well as how pilots are compensated.

Ride-based events, by their nature, carry the highest level of risk and legal responsibility as the passengers are not experienced in balloon operations. There is a higher level of responsibility for the Organizer and the pilots to ensure that passengers are briefed on all aspects of the flight and the risks involved. This type of event needs the assistance of an experienced commercial ride operator to assist and advise the Organizer in all aspects of passenger ride management. The use of properly crafted waivers and release of liability forms is a necessity. An example of this type of form is included in Appendix L. **All legal forms should be reviewed by a local attorney familiar with the laws of the state in which the event is being hosted.**

Ride-based events may have some simple hare and hound 'races' for the entertainment of pilots and passengers but Organizers, officials and pilots need to understand that "targets" can create distractions to pilots. While passengers may be carried on these types of races, passengers should be properly briefed on all aspects of the flight. FAA Waivered events permit carrying paying passengers as 'designated flightcrew' during events. Some FSDOs (Flight Standards District Office-local offices of the FAA) limit passengers to two and it is incumbent upon Organizers to determine the specific requirements of the 'special provisions' of their approved FAA Waiver in this matter.

When dealing with paid rides, Organizers should review their legal and IRS filing obligations with appropriate professionals.

Combination Events may combine competition and some sort of Festival flying. Combined events generally divide the pilots into their respective groups or divisions and assign a director or leader for each classification. Pilots for both groups share common airspace, launch and landing facilities and are generally briefed and controlled by the same group of officials.

The Non-Event Event often involves a group of pilots meeting for a weekend competitive flight. This is a non-structured gathering possibly for the purpose of pilots competing to earn competition points for the BFA/HACD National Eligibility List. Other examples might include an informal gathering of pilots to promote a local church or other charitable function. While these activities are not events in the strict sense of the word, individuals providing the service of Balloonmeister and weather official should embrace the safety concepts outlined and discussed in this publication.

Auxiliary Operations

Auxiliary operations refer to all other related balloon activities other than the primary morning and evening balloon flights. Event Organizers make the decisions on what auxiliary operations they may wish to feature during their event. Since these operations involve balloons, the Organizer needs to consult with and utilize balloon pilots experienced in all aspects of hot air balloon operations before incorporating any of these auxiliary operations into their event. Some of the 'typical' auxiliary operations featured at balloon events include those listed below. While these are popular with Organizers and spectators they each have unique risks and require specialized operational knowledge.

Balloon Night Glows involve illuminating a ground-based static displayed balloon using features of the burner providing a unique glowing flame. It creates an added spectacle for crowds and media. These luminaries were first staged in 1980 at the Great Texas Balloon Race in Longview, Texas. Balloon glows have become a staple at events ever since that time. While balloon glows may appear to be simple evening static displays, there are complications caused by a dark launch field. Balloon inflations, if initiated after dark, are riskier for pilots and crews. An errant burn can quickly burn an envelope or

damage an attachment cable. Crown lines and tie-offs are lying on the ground or in use by crew and can become tripping hazards. Evening winds, if strong or gusty, can create hazardous conditions for balloon equipment or to the general public if they are allowed access to the operations field. Secure tie-offs are essential for balloon glows as there have been incidents of glow balloons breaking away from their tether and faced with landing safely after dark. Balloons participating in ground-based static displays after sunset are not required to be equipped with aviation lights in accordance with 14 CFR § 91.209, Aircraft lights, for night VFR operations and tether operations are required to be equipped with aircraft lights and the lights must be deployed when tethering above thirty (30) feet AGL., If an event intends to do night tethers or otherwise permit a balloon to leave the surface, participating balloons must comply with 14 CFR § 91.209 and Order 8900.1, Flight Standards Information System (FSIMS), Volume 3, Chapter 6, 3-152 A.

Candlestick Glows are a good alternative to the tethered glows discussed above when excessive winds are present. These glows involve only the use of the assembled balloon basket and burner, which are illuminated in a manner similar to a night glow. As in any activity involving powerful burners and flammable materials, caution must always be taken to ensure winds and other weather conditions do not present a hazard to the planned activities.

Dawn Patrols are interesting additions to events with appropriate landing areas and predictable pre-dawn weather. Dawn patrols require careful coordination of weather at the time of launch through thirty to sixty minutes after sunrise. Fog development can be an issue, especially for events near lakes, rivers or other large bodies of water. Most pre-dawn flight activities are scheduled for a time frame not to exceed one hour before official sunrise due to the pilot currency requirements of FAR § 61.57 (b) Night takeoff and landing experience. Participating aircraft must also be equipped with aircraft lights as discussed above.

Tether Operations are a popular method to provide the public a taste of balloon flight, albeit for a short time and for altitudes less than 100 feet AGL. Tethered balloons provide corporate sponsor exposure for commercial balloons with business logos. Static tethered balloons can also provide a great opportunity to entertain the event crowd when weather visibility minimums prevent free flight. Low ceilings and fog do not prohibit a static tether on the launch field. Given good crowd control and a public-address system, the crowd can also be given access to the inflated balloons offering many photo opportunities and the opportunity to get up close to the giant aerostats and speak with the pilots and crew.

As balloons are not designed specifically for tethered flight, tethering places enormous and potentially destructive forces on them and all auxiliary equipment pressed into service. An inflated 77,000 cubic foot balloon contains approximately 5,900 pounds of air. Any lateral movement of a balloon envelope caused by straight line winds or gusts puts this mass in motion and creates momentum. A 10-knot wind on a tethered "77" can generate an internal force exceeding four tons. Gordon Schwontkowski, in his *Hot Air Balloon Crewing Essentials*, has a thorough discussion of the complexities of tethering and the necessary equipment to perform safely. Any event considering using tethered balloons should become familiar with this publication.

Walk-Through Balloons are staged with envelopes that are no longer airworthy for flight. They can be a great entertainment and educational tool for balloon events. These envelopes are well secured, being tied to the ground at several locations. No heat is introduced to provide any lift. Squirrel cage fans or inflator fans are used to continually pressurize the envelope and the mouth is open to allow ingress and egress. The primary safety concern related to walk thru balloons is the inflator fan. The typical inflator fan (not squirrel cage fan) is considered one of the most dangerous pieces of balloon equipment and must be monitored if used.

Kids and parents alike enjoy entering the balloon and viewing the internal parachute rigging and deflation lines. It's a great opportunity to introduce ballooning to youngsters.

Selection of the Balloonmeister

This is possibly the most important decision of any Event Organizer. Chapter 3 provides a complete discussion of the experience and expertise needed to fulfill the responsibilities of this most important role. In addition to the technical balloon experience, the Balloonmeister must possess leadership skills and a

personality that can mesh with the Organizer and pilots alike. Personality traits sought might include: fair but firm, cooperative, team builder, decision maker, and strong people skills. The Balloonmeister must have the experience and background to command the respect of the pilots attending. He must be able to remove himself from the pressures of the Organizer, sponsors and pilots alike and make decisions based on his team's evaluation of the information available.

Communities are often blessed with an experienced balloon pilot who has served in this capacity and has the necessary experience and talent. Sometimes they are willing to provide the services of an Balloonmeister gratis as a way of contributing to their local community. It is important to note that the job and responsibilities of an Balloonmeister are no small task. The Balloonmeister is often exposing himself to risks typically not covered by any event insurance unless the event has purchased a non-owned aircraft insurance policy. A Balloonmeister, regardless of any compensation, typically accepts this responsibility for the love of the sport.

Compensation for the Balloonmeister and his staff is quite common. The compensation can vary greatly from event to event depending on factors such as: size, number of days, complexity of event, media scrutiny and many other factors. Compensation rates of \$1,500 to \$5,000 are typical for a normal weekend event. These rates could go up significantly depending on the time commitment, technical complexities and risks involved.

Once a Balloonmeister has been selected, a written contract or letter of understanding should be developed. This letter of understanding should outline the principal responsibilities of the Event Organizer and Balloonmeister as they relate to each other. Compensation should be outlined as well as a clear understanding of the fair-weather nature of balloon events. A simple example of the Letter of Understanding is provided in Appendix A.

Determining the Best Dates for an Event

The dates selected for a balloon event often coincide with a community celebration such as Fourth of July, Pumpkin Festival, Kentucky Derby, air show, county fair, etc. In those cases, there is little left to do but hope for good weather. Many events have established their dates considering two major variables: local weather patterns and other events likely to compete for the same participating pilot base.

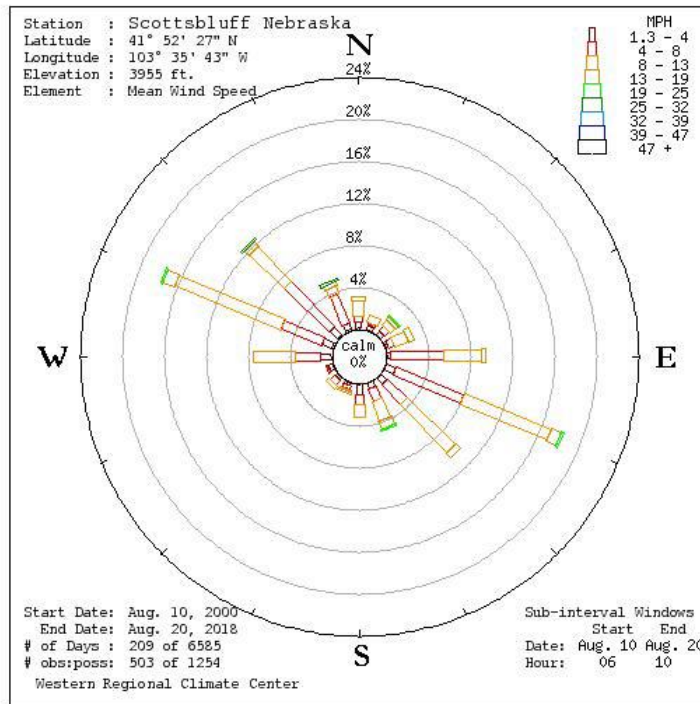
If establishing a first-time event, research should be performed on historical weather patterns. Generally, there are a few weeks or months of the year that provide the best weather patterns that will increase the potential success of an event. Try to avoid periods of turbulent weather, low ceilings and visibility, wind, instability, and precipitation. However, remember what the folks on Wall Street say, "past performance is no guarantee of future results." There are websites that offer a good look at historical weather data important when selecting event dates. The National Oceanic and Atmospheric Administration (NOAA) has six regional climatic data centers (e.g., Western, High Plains, Midwestern, Southern, Northeast, and Southeast). The two websites below show examples of the climatology available from these sites:

https://wrcc.dri.edu/cgi-bin/wea_windrose.pl?

<http://mrcc.isws.illinois.edu/CLIMATE/>

Here is an example of Wind Rose data gathered for Scottsbluff, Nebraska for the period August 10-20 over the last eighteen years. Wind data shown is from 6:00 AM to 10:00 AM.

Scottsbluff Nebraska



Scottsbluff Nebraska - Wind Frequency Table (percentage)

Latitude : 41° 52' 27" N	Start Date : Aug. 10, 2000	Sub Interval Windows
Longitude : 103° 35' 43" W	End Date : Aug. 20, 2018	Start End
Elevation : 3955 ft.	# of Days : 209 of 6585	Date Aug. 10 Aug. 20
Element : Mean Wind Speed	# obs : poss : 503 of 5016	Hour 06 10

First time events, with no proven track record to attract pilots, should consult calendars posted on the BFA or other web sites to avoid scheduling conflicts with other popular events often attended by pilots likely to have interest in their event. Pilots generally have several events they could attend on any given weekend. Pilots tend to be loyal to long established events that offer a well-organized and safe event. Event amenities, prize funds and available paid rides are major considerations of the pilot decision-making process.

Fundraising and Budget

Everything has a price and hosting a hot air balloon event is no different. Once the event's format has been established, the initial budgeting process can begin. There are a number of factors to consider when planning a balloon event. As a rule of thumb, if planning to host an event, plan on providing the following: housing for the evening prior to a planned morning flight (weekend event – two night's accommodations, long weekend – three to four night's accommodations); propane; hospitality including continental breakfasts, an evening meal and awards breakfast/brunch; pilot pack; and a prize fund. This cost can vary greatly depending on your area's economics and how much is affordable. Plan on a minimum cost of \$750 to \$1000 per balloon for a well-run event. Many established events have budgets well over \$1000 and can easily run as much as \$2000 per balloon.

There are so many variables affecting the budgetary process that it is impossible to provide specific budget guidance. Many locations are blessed with sponsors willing to provide cash or in-kind contributions, permitting Organizers to offer substantial incentives to pilots attending their event. Appendix B is a model budget designed for a fifty-balloon event. The budget is intended to stimulate the thought process and help Organizers consider the financial implications of hosting a hot air balloon event.

Sponsor Relations

Sponsors are the lifeblood of any balloon event. Without the generous support of local community businesses, a balloon event cannot be established. While the cost of running a balloon event can vary greatly, there are certain fixed expenditures that require funding. These items were discussed above.

Recruiting sponsors requires a game plan that not only explains the event's needs but also demonstrates a return on investment to the potential sponsor. Return on investment can mean different things to different sponsors; sometimes it's just a warm fuzzy feeling about supporting the community but sometimes the sponsor is looking for a real marketing payback measured by their company's name exposure and visual impressions. Each event will have to establish their budget and plan on how to solicit the needed dollars or in-kind contributions.

It is absolutely critical that Event Organizers communicate clearly to their sponsors that ballooning is a fair-weather sport subject to the whims of Mother Nature. There are no guarantees of flights and all activities are weather dependent. Each sponsor should have a written contract explaining exactly what they will receive for their sponsorship as well as explaining the event's dependency on good weather. See the sample sponsor contract in Appendix C. Sponsors are often enticed with the promise of a balloon ride. While this is a successful technique to lure sponsorships, it does have its potential pitfalls. Sponsors may feel they have been promised or guaranteed a ride. Consequently, they may apply pressure to event Organizers and officials to fly in what might be determined to be marginal conditions. It is imperative that sponsors don't have unrealistic expectations.

Hospitality and Housing

Weekend events are expected to provide housing to the participating pilots. While some events may have the budget to provide the pilot and crew two rooms, a minimum of one room for two nights should be provided. Some events with limited local hotel space have been very successful housing pilots and crew with local families. Events should use the rule of thumb of providing a hotel room for the evening prior to any scheduled morning flight. Some events start on Friday morning or occur over a long holiday weekend. In these cases, a room should be provided for each additional day.

There is a wide range of hospitality offered at balloon events. Generally, a minimum of coffee and donuts are provided for morning briefings. Evening meals, parties, cook outs, etc. vary greatly and are based on available budgets. Most events offer a closing breakfast or brunch at which awards are presented and pilots and sponsors are recognized.

Local Crew

Pilots traveling to balloon events are often in need of local volunteers to serve as balloon crew. Many locals are eager to assist with the balloons and enjoy assisting the pilots. Organizers should establish a committee liaison to solicit and coordinate this need.

Facilities

This section will explore the many responsibilities and logistics related to the facilities that should be considered when planning a hot air balloon event.

A suitable launch field clear of obstructions is the first area of concern. The size of the launch field is dependent on the number of balloons participating and, to a certain extent, on the type of event being hosted. A rule of thumb would be to provide an open grassy area of approximately 1 ½ to 2 acres for every ten balloons. Written permission of the landowner should be obtained well in advance of the event. In addition to a contract or letter of understanding between the landowner and the Organizer, most landowners will ask that the event name the landowner as an Additional Insured (AI) on the event's insurance and many will require participating pilots to also name them as AI on their policies.

Balloon events attract large crowds. Parking conveniently located near the venue is important and ingress and egress will need supervision. Events typically charge a fee for admittance or parking to offset event expenses. Experience shows that a parking fee based on a flat amount per vehicle (\$5, \$10 or even \$20) is the best approach. Remember the fair-weather nature of ballooning; when the flight is cancelled the public may not expect a refund for parking, but a gate admittance fee may be another matter. When

planning details of an appropriate launch field and parking, consideration to a separate entrance and exit for the pilots is critical. Pilots and crew need to get to flight briefings on time and crews need to exit the launch field immediately after launch to commence the recovery process. If pilot traffic is combined with public traffic it's a recipe for disaster.

Crowds enjoy food and refreshments and also generate trash and require restroom facilities. Be sure to contract for an appropriate number of port-a-jons and appropriate trash containment and removal. The venue's landowner will expect the property to be returned in good condition at the conclusion of the event.

Flight planning and meeting space is required for event officials separate from the pilot briefing area. Both of these areas should be in a location with little or no distractions and quiet enough to permit staff to work and pilots to hear all elements of the flight briefing. While an enclosed building is ideal, tents can provide a suitable environment. Meeting space for the event officials and staff should be available about two hours before the flight briefing and should have accommodations for computers, copiers, Internet connection and worktables. The flight briefing area should have seating for at least the pilot and crew chief. If a sponsor or other rider is involved in the flight, there should be seating for them as well.

Propane refueling is a major safety-related issue for balloon events. In many communities the local fire marshal must approve the details of the refueling plan and will probably require a letter of permission from the landowner where balloons will be refueled. Pilots and their chase crews will need an area large enough to line up away from local traffic while waiting to be refueled. Events should establish refueling rules and should work with their local fire department in the development of those guidelines. The National Fire Protection Association (NFPA) issued new regulations in 2017 (NFPA 58) dealing with the refueling of propane cylinders. Events should become familiar with those requirements and discuss them with their propane supplier and Balloonmeister to ensure compliance. Appendix G is included and contains an example of propane refueling rules and policies.

Marketing and publicity fall under the responsibilities of the event Organizer. In addition to pilot publicity, the BFA web site is an excellent place to post details of your balloon event. Local marketing professionals are an excellent addition to any committee organizing a balloon event.

Security and traffic management is often required for balloon events. Local municipal safety forces usually provide this as a service for community-based balloon events. Depending on the location of pilot hotels, independent security companies may be needed to watch the balloon vehicle parking areas throughout the evening hours. Balloon trailers and pilot electronics, often found in chase vehicles, are easy prey for thieves.

Field entertainment, food and beverage, crafts and balloon souvenir vendors and other activities are the option of the event Organizer. In addition to balloon related auxiliary activities previously discussed, Organizers may want to plan for some type of field entertainment during the non-flight times. Suggestions for consideration include: clowns and magicians, kites, skydivers, pyrotechnics, dogs, and bands.

2.3 Legal Issues to be Considered

Organizing and officiating balloon events carries inherent risks. **All events should seek the assistance of legal counsel from the local community familiar with many facets of the law including: personal injury, premises liability and insurance.** Having the counsel of an aviation attorney, while not necessary, would be extremely helpful.

We have included a number of forms that experienced event Organizers have found useful. **Any form used by an event, especially those containing waivers or a release of liability, should be reviewed by legal counsel familiar with the laws of the state where the event is to be held.**

Event legal counsel is mainly concerned with the event's ability to defend itself should it be named a defendant in a personal injury lawsuit. While the vast majority of the risk in these cases falls on the pilot in command, once named as a defendant, the event is financially responsible to hire legal counsel and provide defense costs. This can be extremely expensive. It is very important to note that these lawsuits involve aviation risks that are generally not covered by general liability insurance. Two methods of covering this risk are discussed below.

2.4 Insurance and Risk Management

Events should meet with their insurance representative and legal counsel to determine what is appropriate for their event's particular circumstances. General liability insurance (on and off premise) would be a minimum requirement and coverage levels and details are a matter for the professionals to help the Organizer decide. It is important to note that general liability insurance does not usually provide any aviation liability coverage. Passenger Liability insurance generally starts from the time the balloon is unpacked, through the flight and until the balloon is packed.

There are two methods of insuring flight related risks: purchase of a non-owned aircraft policy or require participating pilots to name the event as additionally insured on their personal aviation policies.

Non-Owned Aircraft Insurance

This is insurance purchased to insure against the risks associated with passenger and aviation liability as a result of balloon accidents and incidents associated with aircraft not owned by the insured. The policy covers bodily injury and property damage as well as physical damage to the non-owned aircraft for which the insured is found legally liable. The insurance company has the right and duty to defend, investigate, and settle any claim against the insured as covered by the policy and as deemed proper by the insurance company. Premiums for this are more expensive than Additional Insured premiums (see below) and are based on the number of ascensions, glows, tethers and whether rides are sold to the public; however, it provides the Organizer with their own limits as well as covering the Organizer's negligence.

Additional Insured (AI) Endorsements

Many events require participating pilots to name the Event Organizer and others as an Additional Insured on their aviation insurance policy. The Organizer may be primarily seeking defense coverage for any lawsuits including the Organizer relating to damage (bodily injury or property damage) caused, directly or indirectly, by the pilot's balloon. There is a great deal of confusion surrounding this issue amongst balloon pilots. Many believe that naming another party as an AI dilutes their coverage. This is not necessarily true. Most pilot insurance policies include unlimited defense coverage so naming an Additional Insured will not affect the pilot's policy or defense coverage.

The distinction between a Non-Owned policy and being named as an Additional Insured on a pilot's policy is that the Additional Insured endorsement covers only the pilot's (Insured's) negligence, not the Event's (Additional Insured's) negligence. On the other hand, the Non-Owned policy covers the pilot's negligence as well as any negligence that may be assigned to the Additional Insured.

Some statistical information is important to note for pilot's consideration. Both the Schantz Agency and IMC Balloon Agency indicate that very few claims go to court. IMC Balloon Agency, in twenty-seven years of writing hot air balloon insurance, has added literally thousands of Additional Insured endorsements. In those years, they have had only two Additional Insured cases go to court. They paid the defense costs on behalf of the Insured and the Additional Insured and in both cases the Additional Insured was held not liable leaving the entire limits of coverage available for the pilot. These statistics don't mean that an Additional Insured will never be found liable or taken to court . . . but the risk up to date has been slim.

Hold Harmless, Indemnity Agreements

A Hold Harmless (Indemnity) Agreement transfers one party's liability to another. It should be noted that balloon insurance policies routinely exclude coverage for "contractual liability". The pilot might not be able to rely on his balloon insurance policy to cover such an agreement.

Certificates of Insurance

Regardless of the type of insurance coverage event Organizers require to protect the event, events generally require that each participating pilot has an aviation policy in force providing a determined minimum of bodily injury and property damage. Many events today require \$500,000 or even \$1,000,000 in coverage. Many policies limit passenger bodily injury coverage to \$100,000 per passenger. Certificates of insurance only provide evidence of in-force insurance at the time of the certificate and do not confer any rights to the Certificate Holder.

2.5 Crisis Management

Balloon event Organizers and staff should develop an emergency response plan. The plan should be developed to complement emergency response to assist the victims and provide essential and accurate information to the media. Only pre-approved individuals should be permitted to discuss any emergency with the media and only after the facts have been investigated. It is important not to provide speculative information, but it is critical to meet with the media in a timely manner in order to provide accurate information. Organizers should rely upon their experienced Balloonmeister and Safety Officer to do a preliminary investigation and provide the needed information. Also see Chapter 3.6 for information on this topic.

The BFA is currently contracted with Checkmate Public Affairs to provide immediate assistance with crisis communications support should a balloon event experience the need for assistance. Checkmate President Jeff Chatterton has a long history with the BFA and is aware of the issues and events surrounding the balloon industry. Contact your BFA Regional Director for more information, including the preferred rate schedule for Checkmate's communication services, should you need their expertise.

2.6 Pilot Solicitation and Pre-Registration Materials

In order to solicit or invite pilots to participate in a balloon event, the Organizer needs to develop an introduction letter and all the various pre-registration forms required to gather the necessary information for participation. The application cover letter should explain the nature of the event (see Event Format in 2.2 above), explain the nature of the flying area and Organizer expectations, indicate the event's complexity level (Level 1, 2 or 3, see Chapter 6), and list as many of the Event Officials that are confirmed. At a minimum, the Balloonmeister, Weather and Safety Officer should be identified in the cover letter.

While each event has their own unique needs regarding information and participation, there should be a basic **Pilot Application Form** containing on one page all the critical pilot, balloon, and insurance information. We have included a sample master pilot application form and it can be found in Appendix E.

In addition to the Pilot Application Form, a well-crafted **Pilot Entry Agreement** is necessary in the management of risks to the Organizer, officials, sponsors and venue landowners. The Pilot Entry Agreement should be part of the initial mailing to pilots to enable them to review all documents they are expected to sign either in advance or at on-site pilot registration. For the legal protection of all concerned, this agreement should be developed by the Organizer in consultation with legal counsel familiar with the laws of the event's state. Receiving these documents in advance also permits pilots interested in participating ample time to review the document with their personal legal counsel and insurance company should they decide to do so.

Appendix F contains a sample Pilot Entry Agreement. Every event should consult with local legal counsel to determine language appropriate to their event. Each event's entry agreement may contain any number of requirements for the pilot including: sponsor rides, media release, compliance with FARs, sponsor basket banners, glow participation, etc.

It is important to note for the benefit of Organizers, sponsors, event venue property owners, and officials that most Pilot Entry Agreements contain a number of acknowledgements and a release of liability whereby the pilot agrees not to sue the named parties in conjunction with any balloon related activities. Pilots are generally not asked to indemnify or hold anyone harmless for participation in a balloon event because insurance representatives have advised pilots against this practice as it might create a liability for which there may be no coverage. Participation in an event is voluntary on the part of the pilot as is their decision to fly or not fly on any given day.

Organizers, as well as Event Officials, are expected to perform their duties with the utmost level of professionalism.

For purposes of clarity, the referenced paragraphs of a Pilot Entry Agreement (Appendix F) are shown below.

I hereby declare that I am participating in the **<name of event>** on **<insert date>** of my own free volition. I agree that the Organizers and sponsors of this event (including the **<name of event, Organizer, event venue>**, event race officials, your sponsor or any employees, officers, trustees, agents and/or members of the above mentioned

entities) are **providing me with the facilities and means for my participation in this event and in no way do they supersede the responsibility of the pilot in command, as shown in 14CFR § 91.3(a) and elsewhere in the Federal Aviation Regulations (FARs).**

I hereby certify that I am aware of and agree with the responsibility legally transferred to me under the Federal Aviation Regulations (FARs) as regards my personal decision to fly my balloon, and any bodily injury or property damage resulting therefrom is solely my liability, and that my decision as pilot in command may affect my placement in this event if I choose not to fly. **I understand that the pilot of each balloon has full and complete authority over the balloon and is responsible for all decisions to be made associated with the balloon on the ground and in the air.**

I certify that I am of sound mind and body and I have no medical, mental, or physical limitations or conditions that would limit or impair my ability to safely fly my aircraft. I am not taking prescription or over the counter drugs/medications that may impair my ability to safely fly my aircraft.

Officials of the **<name of event>** may supply information, guidance, or data and will use reasonable care to ensure the information is accurate and complete. However, the **<name of event>** assumes no responsibility for the completeness or accuracy of such information. It is my decision whether to rely on that information or acquire additional information. I agree that none of the flights are mandatory and that I will make all flights at my option.

I hereby agree to have in full force during the **<name of event>** a balloon insurance policy with minimum liability limits of \$1,000,000 each occurrence combined bodily injury and property damage, including passengers, but not less than \$100,000 each passenger.

It is my understanding that the Organizers may inspect all balloons entered in the event, but that such inspection is only for the purpose of determining whether the aircraft complies with all rules of eligibility of said event. The approval of the balloon by said officials does not constitute a representation or warranty of any kind or character whatsoever concerning the mechanical condition of the aircraft, or whether or not it is airworthy.

I, the pilot in command, hereby declare that I will fly in accordance with the event rules and regulations, abide by the FARs, and fly entirely at my own risk and waive any right of action against <name of event>, the owner of the launch site, event race officials, your sponsor or any employees, officers, trustees, agents, and their respective members for any loss or damage sustained by me in consequence of any action or omission on their part, my part or the part of other participants.

Thus, I release the Organizers and sponsors of this event (including the **<name of event>**, event race officials, my sponsor or any employees, officers, directors, trustees, employees, volunteers, agents and sponsors and/or members of the afore-mentioned entities) **from liability for their actions or inactions relating to the <name of event> which may arise out of or result from or in any manner be connected with the balloon flight or activity in which I participate as a pilot in command.**

2.7 Landowner Relations

No balloon event can be successful without good landowner relations. The event committee should have a representative familiar with balloon flight (an experienced balloon crewmember or pilot) serving in the capacity of Landowner Relations liaison. Months in advance of the event, the Landowner Relations representative would be responsible to gather all known data on Prohibited Zones (PZs) or other landowner sensitive areas. A complete list of all such areas including landowner name, address and phone number should be assembled and maintained from year to year. See Chapter 3.9 for further guidance.

The pilot in command (PIC) has significant responsibilities related to good landowner relations. Successful landowner relations are the result of a combined effort by the Event Organizer, Officials and the PIC and his crew. All three groups must perform their jobs with the utmost consideration of the property owners generous enough to allow us to use their property for the launch and landing of balloons. Organizers should become familiar with good landowner relations and can find a great source of information in these publications: Balloon Flying Handbook, US Department of Transportation, 6-17 and Hot Air Ballooning Essentials, Gordon Schwontkowski, 145–153.

The work of the Landowner Relations representative will be critical to the preparation and printing of maps to be used by participating pilots. These maps identify sensitive landowner areas as follows:

Red PZ: restricted air space above an identified area that includes a minimum altitude which a participating pilot must fly at or above. The minimum altitude is generally 500 to 1000 feet above ground level (AGL). That altitude should be provided to the pilots in Mean Sea Level (MSL)

Yellow PZ: properties (restricted airspace) where no take-offs or landings are permitted. There is no limit to the flight altitude above these areas.

Blue PZ: restricted airspace as required by the event's local Flight Standards District Office (FSDO) based on airspace in the vicinity of the event. The restricted airspace is an area in which participating pilots may not fly above. This limit is expressed in Mean Sea Level (MSL).

Each event will need to develop rules and policies related to landowner relations management. Here is an example of a general statement that might be included in an Event Operations Manual:

John Doe is our Landowner Relations chairman. He will be in the remote launch and landing areas along with you. His vehicle is marked with a placard. If you need any assistance, please contact him <insert phone number> and he will be happy to help with any situation.

Pilots and crews are reminded of the importance of Landowner Relations. The land is the farmer's livelihood; good farmer relations are essential to our sport. Pilots should be aware of the following:

- *Uncut hay is a valuable cash crop. Landing in an uncut hay field will cause irreparable damage.*
- *Livestock (cattle, pigs, deer, horses, sheep, lamas, etc.) can be easily frightened and, in their panic, do damage to themselves and the farmers' fencing and pens.*
- *Most farmers rely on electrical power in their farming operations, from powering electric fencing to milking parlors. The disruption of electrical power to a farm can have an economic impact.*

Please remember these guidelines when dealing with our landowners:

1. *Always be COURTEOUS and respectful of the fact that you are trespassing unless invited onto the property.*
2. *Select a landing site that will cause the least possible inconvenience to the farmer. Select a field FREE OF CROPS and be particularly CAREFUL OF ANIMALS on the approach and on possible overshoot.*
3. *After landing, DISCOURAGE ONLOOKERS from coming onto the land unless the owner is there and they have his permission.*
4. *ALWAYS obtain permission BEFORE you bring the retrieve vehicle into the field.*
5. *Ensure farm FENCES are NOT DAMAGED and gates are left as you find them.*
6. *DO NOT let anyone LITTER the property.*
7. *If damage is caused, or the farmer wishes to take further action, exchange names and addresses and report the facts to race officials upon your return.*

2.8 Event Administration

There are a number of logistical and administrative tasks to be considered when hosting a hot air balloon event. While the following discussion is far from complete, the major topics are discussed with general guidance provided.

Pilot Acceptance Process

Once the pilot applications have been received from the solicited pilot population and the application due date has passed, the Event Organizer, working with the Balloonmeister, should evaluate the applications and send pilot acceptance packages to the approved list of pilots in a timely manner.

Events should not feel obligated to accept all pilots that apply nor should they arbitrarily accept pilots on a 'first-come, first-served' basis. The evaluation and acceptance of pilots should be based on a number of factors including: flight experience and proficiency with 'event' flying, hours flown in the past twelve months, familiarity with the flying area and topography and any other factors deemed appropriate. Events are looking for pilots that have demonstrated a willingness to follow the rules and policies of the event, respect landowners and work with sponsors in a respectful and nurturing manner. Pilots who follow directions, arrive at briefings on time and prepared to fly should be given priority to those who have been determined to have abused the system in the past.

Airspace Evaluation and Coordination

The National Airspace System (NAS) is the network of all components comprising airspace in the United States. This is a comprehensive system that includes air navigation facilities, airports, aeronautical charts, rules, regulations and procedures. US airspace is divided into one of six classifications: A, B, C, D, E and G. Understanding the details of these airspace designations is complex and will require the expertise of a qualified Balloonmeister to ensure that the event works in conjunction with nearby airports and complies with all communication and flight requirements. The first order of business is to locate the event venue and anticipated flying area on the appropriate aeronautical chart. Once located, the airspace classification can be determined.

Aeronautical charts are available in digital format from the FAA website at:
https://www.faa.gov/air_traffic/flight_info/aeronav/digital_products/vfr/

Waiver Application

Chapter 8 discusses the specifics of applying for an FAA Waiver. This is an important consideration for any event classification and is a requirement if operating from an airport facility or in close proximity to restricted airspace. The Event Organizer should work closely with the Balloonmeister in any decision involving an FAA Waiver application.

Event Rules

Every balloon event needs a rule book or combination operations manual and rule book. Competitive events require a very comprehensive rule book and a well-used example of such rules are provided by the Balloon Federation of America (BFA). The rules are reviewed and published annually on the BFA's web site, [BFA/HACD Rules](#).

Ride-based and festival events need a rule book explaining all the policies and procedures of the event as well as concise rules for any 'fun' competition that might be planned. Utilizing the appropriate sections of the BFA Rulebook for races such as a Hare and Hound or Fly-In as well as many of the general event rules will save the Organizer and officials many pilot complaints.

Map Preparation and Printing

Pilots need current maps of the flying area. While local engineer prepared county or city maps are acceptable in some cases, most events need a custom topographical map of the area including, at a minimum, Prohibited Zones (PZs). There are a number of individuals and companies who prepare maps for balloon events. These are comprehensive, contain all the critical information for the pilot and are competitively priced. This is an important investment for all balloon events. Contact for one map maker is: BalloonMaps.com, ToddHFisher@att.net or info@balloonmaps.com.

Using DeLorme or other mapping software and many available custom overlays, these map makers can prepare an excellent balloon event map for any area. Suggested content for a good balloon pilot map would include the following:

- Topographical format showing elevation highlights, forested, and swamp areas, etc.
- Red and yellow PZs should be outlined and highlighted with any altitude restrictions noted
- Power transmission lines should be highlighted using an appropriate method
- Cell tower locations noted
- Congested or densely populated areas are highlighted to assist with FAR compliance. Consult the local FSDO regarding areas they may consider 'congested'
- A Universal Transverse Mercator (UTM) overlay along with primary grid references allows pilots using GPS technology to quickly locate their map position
- The map's legend typically shows the magnetic variation
- Depending on the flying area, the map is normally prepared in a scale ranging from 1:25,000 to 1:37,500

Equipment and Special Supplies

There are a number of special supplies or equipment needed to host a balloon event. The two most common needs are targets and markers (baggies) used by pilots to drop on targets. While the size and construction materials used for these items may vary, the technical standards established are shown below.



Marker Specifications

Weighted part	10 cm x 10 cm	70 grams
Streamer	10 cm x 170 cm	approx. 7 grams
Total length and weight	10 cm x 180 cm	approx. 77 grams

Weighted Part

Event or Sponsor Name

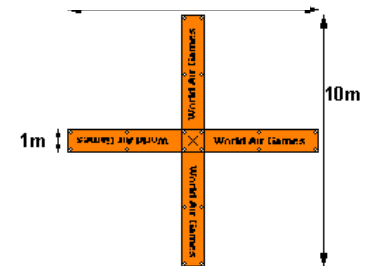
Pilot #

ter to

Target Specifications

The number of targets needed depends on the size of the Event and tasks to be set. It is advisable to prepare not less than five targets.

The dimension of targets is 10x10x1m. They should be made of non-slippery material (rip stop nylon is OK). The color shall be contrasting to the surface (preferable color is white). Targets should have rings or straps at the corners to secure them to the surface.



The center should be marked with a visible "X". The Event and/or sponsor names and logos can be displayed.



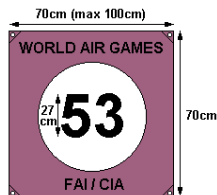
Measuring Tapes

Scoring teams will need measuring tapes and it is recommended that the Organizer provide 100-meter length tapes. These tapes usually provide measurements in meters on one side and feet and inches on the other. A good supply for these is Harbor Freight.

Launch Signals Flags

Signals flags may be used at the primary launch field and signal the pilots with critical launch or other information. The most common flags are approximately 16" X 24" and are used as follows:

- Red No inflation or take-off permitted. Previous permission to take-off cancelled.
- Green General permission to all balloons to begin hot inflation.
- Yellow Five minute warning.
- Pink Supplementary or amended briefing information available at signals point.
- Black Task cancelled.



Basket Banners

Basket banners serve as a source of pilot identification but also serve as an advertising medium for event sponsors. The banner displayed here would be principally used for competition as the competitor's number is critical for the scoring teams. Non-competitive events would generally design the banner with the sponsor's name or logo as the predominant item on the banner. Competitive events usually require two banners per basket but ride-based or festival-sport events

usually only require one banner provided by the organisers. They should be made of durable material and provided with reinforced attachment rings in each corner. The Event and/or sponsor names and logos can be displayed as determined by the Organizer.

Theodolite

While not many organizations or event officials have this instrument at their disposal, it could be the single most important tool for an Balloonmeister and Weather Officer. It is an instrument used to



measure horizontal and vertical angles with a small telescope that can move in the horizontal and vertical planes. It is used to track the movements of either a pibal balloon or a radiosonde. The device uses mathematical formulas and triangulation to provide wind speed and direction in various increments, generally every 200 feet. If you can obtain a theodolite for use at your event, it provides very valuable wind information for officials and pilots.

Clinometer

There are also less expensive approaches to gathering wind information. Various software programs are available that work in conjunction with a compass and clinometer and provide accurate wind speed and direction information for a fraction of the cost of a theodolite. There are several smartphone applications for little, or no cost, that can provide theodolite-type information (i.e. angles and elevations).



Windsound



Another moderately priced wind profile solution (i.e., on the order of \$1000-\$1500, but much less than a theodolite instrument) is a Windsound (windsound.com). The Windsound is a GPS-based atmospheric sounding system with a small USB receiver and the sensors are contained in a Styrofoam cup that can be retrieved and re-used if you are lucky enough to find it. The Windsound gives complete and accurate wind and temperature profile information.

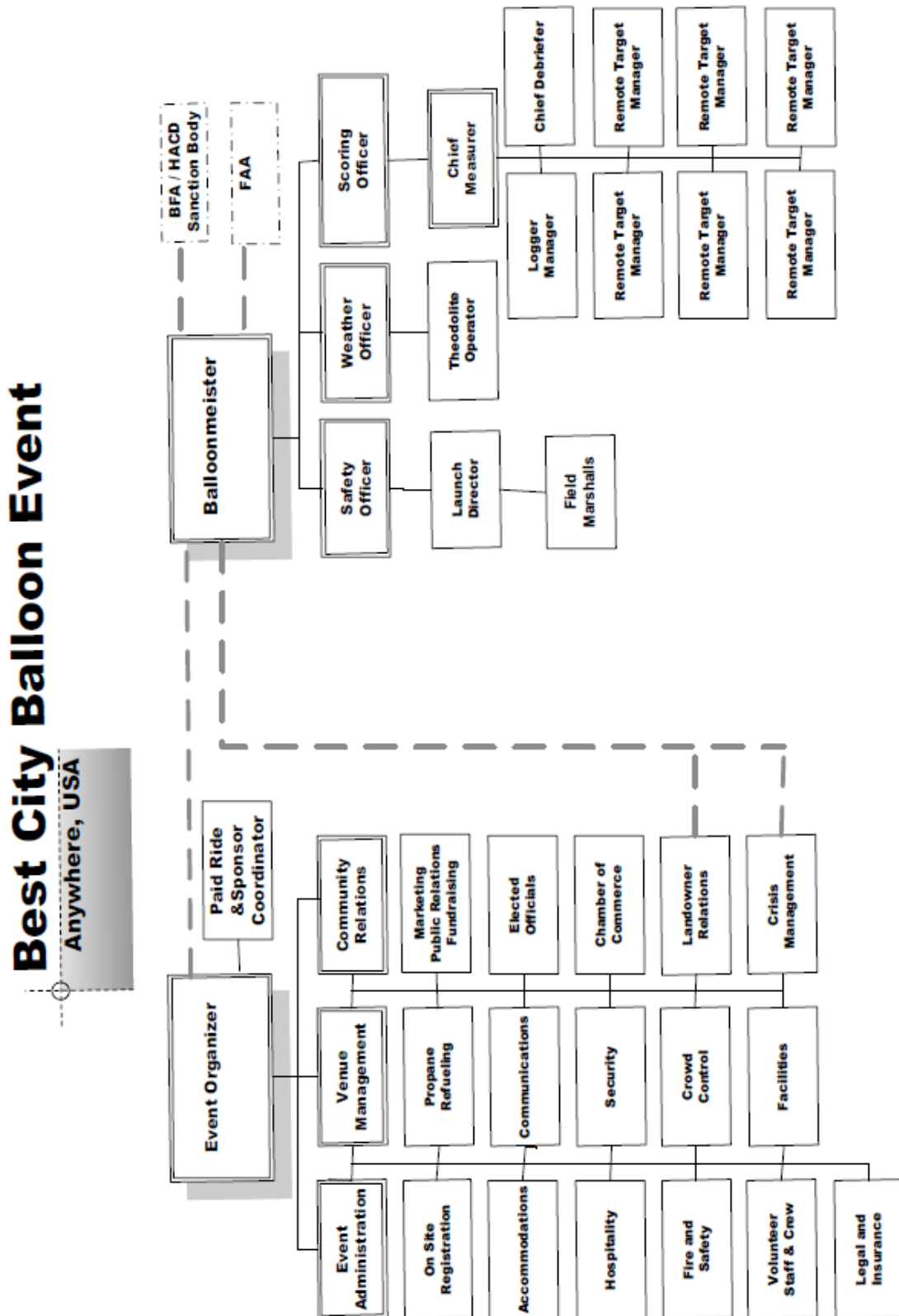
Ride-Based Event Supplies

Events selling rides to the general public will need a number of special purpose supplies including the following:

- Passenger waiver and briefing acknowledgment forms
- Designated Flightcrew Acknowledgement Forms
- Passenger information forms including medical questions related to inability to fly
- FAA approved Waiver and special provisions
- Credit card processing capabilities
- Scheduling board for recording rider and pilot match-ups
- Boarding pass

2.9 Organization Chart

Each event is organized to match the primary purpose and goals of the event. There is no single organizational format perfect for all events. A sample Organization Chart is shown below, and it can be reduced or expanded to meet the individual needs of any event.



Chapter 3

Event Officials

Staffing Considerations and Required Technical Skills

3.1 Introduction and Team Building

Balloon event officials are a unique group of individuals. They should possess an extensive amount of hot air balloon experience, including participation in many balloon events, and they have a deep respect for the safety needs of the sport. They must also be able to develop camaraderie and work well together with the event Organizer, fellow officials and participating pilots. Each official has a specific duty, but all interrelate with one another. No one job stands alone. While the personalities must work well together, each individual should also act independently and speak his own mind as each flight plan is developed.

This chapter is intended to provide guidance to event Organizers in selecting and developing the proper technical staff for their event. It is also provided as background information to existing event officials and those who aspire to develop the skills necessary to work in these areas.

3.2 Balloonmeister

The title assigned to the individual in charge of all balloon activities is commonly called Balloonmeister. In the early days of ballooning and in many events even today, that individual is referred to as the Balloonmeister. The term *Balloonmeister* dates back to the early days of gas ballooning. It was this Balloonmeister who was responsible for orchestrating and controlling the launch of the gas balloons.

The Balloonmeister is the director of all flight related operations at a balloon event. It is recommended that the Balloonmeister be an experienced pilot. The Balloonmeister works with the Event Organizer in the planning and organization of a balloon event from its inception. He ensures that all aspects of the flight and related activities are properly organized and executed. He recruits his fellow officials including the Safety Officer, Weather Officer, and Scoring Officer, if applicable. If the event is large enough or has both a festival group as well as a competition group, the Balloonmeister may also have an Assistant Balloonmeister.

The Balloonmeister is responsible for all the technical balloon aspects of the event. He runs the general briefing of pilots prior to the first flight in which event rules, policies, sponsor and ride management as well as all aspects of an FAA Waiver, if applicable, are reviewed. Pilots' questions on any aspect of the event are answered at this general briefing. The Balloonmeister also runs each pre-flight briefing covering weather, review of PZs in the flight path, rules for the particular flight, launch times and any other data important to the flight. Flight briefings include the pilot, crew chief and any sponsor or paid passenger riders. Some events hold separate briefings for paid passengers or sponsor riders covering the important safety aspects of the flight.

Balloonmeister Experience

The job of an Balloonmeister is a complex one. It requires a thorough knowledge and understanding of weather, particularly micrometeorology, Federal Aviation Regulations, human nature, pilot personalities, organizational skills, team building and balloon competition concepts. The Balloonmeister should be an event-experienced pilot having accumulated significant experience as pilot in command to have built a skill set appropriate to the event's complexities. This experience should include a minimum of two hundred hours as PIC. A Balloonmeister serving a Level 3 classified event (see Chapter 6) will need significantly more experience than required for a Level 1 event. All Balloonmeisters must start someplace and somewhere along the line they will tackle their first event. This is understandable. However, we recommend that before taking on a first event, the aspiring Balloonmeister work with an experienced Balloonmeister willing to mentor and share learning experiences.

It's imperative that the Event Organizer has complete confidence in the selected Balloonmeister. They need to work together and yet remain independent when critical flight decisions are required. As a rule of thumb, a new or inexperienced Organizer should seek an Balloonmeister with a higher level of experience able to provide much needed advice on a wide range of balloon event subjects.

Technical Skill Set

Here is a checklist developed as a starting point for establishing minimum technical knowledge and skills of an Balloonmeister.

- Commercially licensed LTA pilot
- Understanding and adherence to the principles of the BFA's *Balloon Event Guidelines*
- Possess a strong knowledge of micrometeorology
- Ability to use Internet to gather standard weather briefing data but also understand and utilize critical wind information available from VAD winds and Rapid Refresh Model (RAP) wind models
- Can read a 'PIBAL' for wind direction but also for estimation of speeds, existence of wind shears or other unusual behavior.
- Knowledge of the local flying area and topography
- Strong map skills including source for printing customized event maps
- Ability to develop an operations manual containing critical organizational and logistical event information
- Ability to prepare application for FAA event Waiver and work with any FAA monitors or personnel
- Has an understanding of the event's participating pilot skill set
- Has knowledge of critical insurance and legal issues and how they impact an event, the Organizer, officials, and pilots
- If the event involves competitive races, the Balloonmeister should have competitive flying experience and a thorough knowledge of the BFA competition rule book
- Possesses good writing and computer skills
- Possesses good public speaking skills

Personality Traits

An effective Balloonmeister needs to balance the needs and wants of the Organizer with those of the participating pilots all within the framework of a well-organized and safe environment. No two Balloonmeisters are alike but the best share some common characteristics including:

- Strong organizational and team building skills
- Firm but fair
- Good listener
- Independent and unbiased
- Strong people skills
- Flexible, can admit mistakes, make corrections and move on

Can a Participating Pilot Serve as Balloonmeister?

In order to direct flight operations, monitor launch, flight and landing activity, monitor potentially changing weather conditions and be available for required communication with any assigned FAA personnel, the Balloonmeister should remain on the ground and not participate in the event. Even if it is not a conflict of interest, it is certainly a conflict of needed attention. These guidelines strongly recommend that event officials do not fly in events in which they are serving in an official capacity.

Sometimes a group of pilots (six to ten) will gather for a weekend competitive flight or club fly out. In this case one person may give the weather, call a task and fly. This is not inappropriate as it does not constitute an event in the strict context of these Guidelines. The same standards of safety would still apply, and the decision makers should be aware of these Guidelines. See discussion of a Non-Event Event in Section 2.2.

One Last Checklist

Items pertaining specifically to competitive events, included in the BFA publication *Hot Air Competition Division Guidelines for Event Organizers*, include these Balloonmeister's responsibilities.

- Works with the Organizer in the organization of a balloon event from its inception
- Ensures that all aspects of the flight activities and related activities are properly done

- Ensures that the BFA sanction, if applicable, is properly applied for
- Selects launch and target fields
- Sees that sufficient markers and targets (Xs) are available
- Ensures the preparation and printing of the rules and maps for pilots and Officials
- Ensures that pilots be furnished a schedule of events showing the time and location of each pilot briefing. This schedule should also include the number for weather, (FSS), and lost-balloon call-in number.
- He consults the BFA/HACD rules in conjunction with the Weather Officer, Safety Officer and Scoring Officer to choose what competitive task to hold
- He briefs the pilots, crew chiefs and any passengers on all applicable information for that flight
- After the task, he oversees the Field Measurers, Debriefers and Observers (if used), in conjunction with the Scoring Officer
- He consults with the Scoring Officer in the assessment of penalties
- Special use airspace, unfriendly landowners, expensive livestock or any other area may be declared a red prohibited zone. The location along with a height and radius restriction is published for pilots to mark on their maps. Red PZs will normally require a 500 to 1000 ft. AGL height overfly
- There may also be prohibited zones that can be designated as fly-through yellow PZs. This would be property where the owner has requested that the balloons do NOT land, such as an area of new pine trees, but there is no need for an altitude restriction.
- Balloon Field, Briefing Area, and Posting Station: for fly-in events, the balloon field must be a safe location to make a pass over in a balloon. It should be an area clear enough and large enough to allow an unobstructed view of the target and be free of power lines and other obstructions. For mass launches, the balloon field needs to be large enough to launch all the expected balloons and be free of power lines and other obstructions. The balloon field should also be large enough to accommodate the expected spectators and provide parking space for the spectators. The BFA/HACD Safety Officer should approve the field before the event starts.
- The briefing area, scoring area and posting station (for posting results) should be close to the balloon field.

Pilot Briefings

Each balloon event starts with a **General Briefing** at which the Balloonmeister reviews the event's policies and procedures and anything unique to the event. Organizers and important event staff are introduced. If operating under an FAA Waiver, details of the Waiver are reviewed and any pilot questions or need for clarification are handled. The Balloonmeister should ensure the following are announced at the General Briefing:

Names of Officials

Balloonmeister
 Scoring Officer
 Chief Measurer
 Safety Officer
 Weather Officer
 Paid Ride/Sponsor Ride Coordinator
 Facilities Coordinator
 FAA Liaison
 Landowner Relations
 Launch Director and Field Marshalls

Phone Numbers (ensure they are also posted)

Lost Balloon/Crew Number
 Emergency Number(s)
 Nearest Weather Reporting Station
 Control Tower, if applicable

Date, Time and Place of the next required Pilot's Meeting

Consultation with Scoring Officer, Weather Officer and Safety Officer

The art of directing a balloon event begins with a great team of officials. The **Flight Briefing** occurs before each scheduled flight. The Flight Briefing is a culmination of about two hours of advance weather investigation and flight planning by the Event Officials. Two (or three) heads are usually better than one. The Balloonmeister should discuss every aspect of the flight/task with the Scoring Officer and Safety

Officer. The Balloonmeister needs the specific concurrence of the Scoring Officer for task selections. While go/no-go decisions are the final responsibility of the Balloonmeister, that decision should be made in consultation with the Safety and Weather Officer.

The Flight Briefing contains four principal elements:

Roll Call: accurately record pilots in attendance as well as note late arrivals

Weather Report: including meteorological synopsis, surface winds, winds aloft, current observations, forecast conditions, radar and any other pertinent data

Flight data:

- a) Date
- b) Official sunrise/sunset
- c) PZs in force
- d) Launch area
- e) Launch period

Individual task data (if applicable):

- a) Marker(s) color to be used (if used)
- b) Task/Marker order
- c) Dropping method
- d) Marker Measuring Area (MMA)
- e) Scoring period and scoring area
- f) Task data as per task rule

Briefings should begin on time. The Balloonmeister will prepare and hand out all the information on the task briefing sheet, announce a time check and do a roll call. The Weather Officer will give a weather briefing and synopsis. The Balloonmeister will review the task sheet/flight plan and answer any questions and or concerns from the participating pilots, crew or other flight participants.

Some Hare and Hound Thoughts

Many believe the Hare & Hound race to be the simplest of all tasks. Much of the success of a Hare & Hound task hinges on the competency of the Hare Balloon Pilot. The Balloonmeister usually has the responsibility of choosing and briefing the Hare Balloon Pilot. The Hare Pilot should be an experienced pilot who is not inclined to show off flying and who will follow instructions. The Hare Pilot should be instructed to fly for 30 to 45 minutes and find a large landing point free of hazards. Instructions should remind him to fly at an altitude that will move him along and not force competitors to fly too low. A good altitude is generally 1000' to 2000' AGL. The objective of the Hare Pilot is not to lose the pack. A good Hare Pilot will test the skills of the hounds but keep the hounds in the race. The Hare should not spend too much time flying low before landing because this may force competitors to fly low to do well. The Hare should not touch the ground until the final landing. On landing he should deflate immediately and spread out the target directly upwind from the basket and not more than 1.5 m (5 feet) away. If a Hound Balloon hits the Hare Balloon while inflated, this should not be considered ground contact. It is best if the Hare balloon carries a measurer and tape measure so that scoring may begin immediately. It is common for the officials chasing the Hare Balloon to become stuck in traffic and not be immediately available to assist with measuring.

3.3 Assistant Balloonmeister

Oftentimes an Assistant Balloonmeister is utilized for larger events. Their duties are at the discretion of the Balloonmeister but the Assistant Balloonmeister should have the ability to take over for the Balloonmeister should he become incapacitated due to illness or other unanticipated events. The Assistant Balloonmeister position is a great means of training and development of future leaders.

3.4 Weather Officer

The Weather Officer is a critical member of the event Officials' team. Chapter 4 provides detailed guidance on the background and experience needed by the individual providing this service. The Balloonmeister and Safety Officer should work in concert with the Weather Officer and develop a set of

weather parameters that all officials are comfortable with long before the event starts. The following variables should be considered when developing weather parameters: surface wind throughout the flight window; winds aloft (200' to 3,000'); flight direction issues; ceilings and visibility; proximity to fronts, precipitation and turbulence; topography; and experience levels of participating pilots. Each event and location have unique characteristics that impact this process. For that reason, each Event must establish a weather minimum/maximum decision matrix unique to the Event. In order to assist Event Officials in this process, a sample Weather Parameter Matrix is included in 4.11.

3.5 Safety Officer

The Safety Officer is an integral and important member of technical staff of any Event. The Safety Officer, in concert with the Balloonmeister, is responsible for the safety of flight operations, refueling facilities and on-site activities before and during the Event.

The subject of whether the Safety Officer should be able to participate as a pilot in an event is complicated by the lack of experienced pilots willing to serve in this capacity in lieu of flying the event. Larger events or those complicated by variables discussed in Chapter 6 are best served by Safety Officers who do not participate in the event as a pilot. Smaller events (thirty or less balloons) often utilize a safety officer who is also a participating pilot. If this is the case, the Balloonmeister should assign someone to handle the on-ground responsibilities of the Safety Officer during the flight process.

Qualifications

Basic background and qualifications of the Safety Officer include the following:

- Must have hot air balloon piloting experience and at least a private LTA license
- Must have gained some experience in Balloon Event flying as a participant or official
- Must have a basic understanding of emergency procedures and first-aid
- Must have a strong understanding of meteorology and its impact on balloon operations
- Must be an independent thinker, willing and able to express views based on his independent appraisal of information

Pre-Event Duties and Responsibilities of the Safety Officer

Many of the duties and responsibilities of the Safety Officer occur before the start of the Event. These include:

Emergency Response Plan

Work with the event Organizer and Balloonmeister to develop an Emergency Response Plan (see 3.5 for details). This is a requirement of the FAA's current guidance in Order 8900.1 (FSIMS), Volume 3, Chapter 6.

Safety Plan

The current FSIMS requires development of a Safety Plan. This plan needs to evaluate the event's areas of risk, e.g. crowd control, spectator and pilot primary launch field ingress and egress (vehicular and pedestrian movements), propane refueling, secondary target control, balloon launches, fire, launch area ground hazards, power line incidents, etc.

Review Rules and Documents

Review all rules and regulations developed for the event. These include event competition rules, policies and procedures, Federal Aviation Regulations and any pertinent local government regulations or ordinances.

Review Potentially Dangerous Flight Areas

In concert with local event officials or Organizer personnel, review any potentially dangerous areas that may be in the flight area of operations. Any restricted airspace, large power distribution areas, and power stations should be reviewed and pilots advised.

Review Landowner Problem Areas

Working in concert with the local landowner relations liaison, review any potential landowner problems and document Prohibited Zones.

Become Familiar with the Flight Operations Area

The Safety Officer should become familiar with the flying area by means of a balloon flight or small aircraft, if possible. It also would be prudent to be familiar with the terrain within the flight operations area and spend some time driving the area to assess unsafe areas, potential target problems, local road conditions and traffic.

Recall Procedures

In case of rapidly deteriorating weather or other emergencies, events must establish a communication method to reach pilots and/or crew with critical information. This “recall” procedure must have the ability to communicate in a very short period of time with all participants and officials. With today’s technology there are many alternatives to the old days of asking a radio station to break into its regularly scheduled broadcast.

Together with the Balloonmeister and the Organizer, determine the most suitable recall procedure for the Event. Recall procedures used have included radio station broadcasts or an assigned aircraft radio frequency. Whichever method is selected, ensure that the Balloonmeister can reach all participants with this recall procedure. One method of recall found to be extremely effective and cost efficient is the use of a mass dialing and messaging service using the cell phones of participating pilots and crew chiefs. **‘Remind’** offers this service at reasonable rates and can be viewed at <https://www.remind.com/>.

Establish Contact with Local Emergency and Electrical Services

The Safety Officer should establish friendly contact to ensure emergency and electrical services are aware of the Event. Inform them of unlikely but possible scenarios such as a multi-trauma accident, electrical damage, burns, etc. Review first responder actions should there be a power line contact. Work with the Organizer and encourage the presence of EMS and other emergency support personnel convenient to the balloon event venue. Prepare a list of emergency contact phone numbers including local emergency, fire, police, electric companies, and addresses of local medical facilities.

Alcohol and Drug Policy

Work with the Balloonmeister to develop a policy and plan to deal with the potential of intoxicated pilots, crew or passengers. Review timing of social activities in relation to ‘bottle to throttle’ FARs and recommend appropriate times to shut down the serving of alcohol, if applicable. The Safety Officer can take whatever action he feels appropriate and should immediately inform the Balloonmeister of any impairment issues throughout the Event.

When satisfied with the above items, review with the Balloonmeister the proposed flight activities to ensure that none of the planned activities are unsafe. The Safety Officer needs to be alert for any local conditions that may have been missed. It would be best if this consultation were to be well in advance of the event starting date.

Event Duties and Responsibilities of the Safety Officer

The following items are the basis for coordinated and efficient duties to be performed by a Safety Officer during an event. It should be noted that additional duties and areas of responsibilities may be included to increase and enhance Safety Officer’s duties based on the particular needs of the event or management style of the Balloonmeister.

It is of great importance that a Safety Officer is in constant contact with the Balloonmeister and other officials. This should be achieved with reliable and serviceable communication equipment, radios, cellular phone or other such devices. An additional benefit of effective communication equipment is that it allows freedom to monitor launches, propane re-fueling facilities, flight operations, off site weather conditions and other important concerns.

Pre-Flight Planning

The Safety Officer should be thoroughly involved with all phases of pre-flight planning. Weather monitoring was previously discussed but, in addition, all relevant flight information including the planned flight profile, potential launch and landing locations need to be considered. Does the flight plan include flights over or in close proximity to restricted air space, prohibited zones or troublesome landowner areas? Can the flight plan be accomplished in an appropriate amount of time giving

consideration to the development of thermal activity and allowing for the potential of difficult or tight landing areas?

Monitor the Weather

If the weather is excellent or completely unflyable, the job of weather analysis is easy. If conditions are uncertain or marginal, the Safety Officer must ensure that the highest degree of skill and knowledge is used in interpreting the weather. Some helpful hints on how to best accomplish this are:

- Make an independent check on the weather. Remember that the local weather information source may be unfamiliar with ballooning requirements and that the answers and interpretations given may be influenced considerably by who asks the questions and how they are asked. This being the case, getting two separate versions, independently, is wise. The Weather Officer will likely have the detailed and updated weather information, but it is acceptable for the Safety Officer to do an independent check of the local weather information to facilitate a discussion with the Weather Officer and Balloonmeister.
- REMEMBER, the concern is with forecasts! Keep in mind that it requires at least several hours for the Balloonmeister and Officials to obtain a weather briefing and interpret it, decide on the flight/task to be flown, assemble and brief the pilots; for the pilots to lay-out and inflate their balloons, fly the event, land and recover their balloons. The real question is not what the weather is at the time planning starts, but what it will be until the time the balloons have landed and recovered. Conversely, while the weather might appear a bit nasty at the start of committee planning, a brief holding period might allow time for the "weather" to pass and thus permit a flight during the ensuing good weather conditions.
- Get all available information on Temporary Flight Restrictions (TFRs), NOTAMS, Airmets or Sigmet.
- Use the greatest caution in using or interpreting weather information obtained from a Flight Service Station. This is not a reflection on the many dedicated and skilled Flight Service Specialists; it is merely recognition of the way that aviation weather information is propagated. The Flight Service Briefer is constrained by regulation to pass on only information that is contained in the National Weather Services (NWS) forecasts. He may not make any of his own forecasts or interpretations of this weather data. Moreover, many weather phenomena pertinent to ballooning do not appear in official Weather Service forecasts; for example, and most importantly, winds of less than 10 knots do not appear in the teletype forecast printouts.
- If it is at all possible, and in most areas it is, request the Flight Service Specialist to provide direct contact with the nearest National Weather Service contact. NWS personnel have more available time and are usually willing to discuss present and future weather conditions. Be prepared to discuss the idiosyncrasies of balloon flight so that they are better able to provide the needed information. They can provide more detailed data on winds at ground level and at various altitudes that may be encountered. In addition, they are usually in a position to postulate on weather conditions covering periods much later than the 6-hour forecasts obtainable from Flight Service.
- Remember, balloon events are comprised of many pilots with differing skill sets. The Safety Officer should ensure that the Balloonmeister has made it clear that all flight decisions are the responsibility of the PIC. It is always appropriate to encourage less experienced/skilled pilots to remain on the ground if the PIC is not completely comfortable with his skill set for a particular flight.
- Generally, flight service forecasters have little information available on low level winds. Ask the briefer for a VAD wind analysis if available. Pibal readings at the launch field are invaluable to make decisions on tasks and many other safety considerations.
- Working in conjunction with the Weather Officer, discuss any weather concerns with the Balloonmeister during the planning period for each flight. Keep a constant watch on marginal weather conditions throughout the day to be able to assess any deterioration or improving trends that were not forecast.
- If conditions are marginal prior to any mass launch, it is suggested the Safety Officer or his delegate proceed to potential targets or landing areas to assess local conditions, which may not be known at the launch site. Advise the Balloonmeister of low ceilings, limited visibility or gusty winds.
- Before launch time, look frequently upwind to the sky to find sudden changes in the weather.

Pilot Briefings

During each pilot briefing, be sure the following is adequately covered:

- Weather - it is very important that the best possible weather briefing is given
- Airspace restrictions, such as local airports or special airspace
- Power lines, telephone wires or other hazardous obstacles in the launch or target areas
- Any other available information concerning hazards in the local flying area
- Ensure pilots and crews are provided with the lost balloon and weather recall information, phone number and/or radio frequency
- Launch Director and Field Marshall assignments and identification, if necessary.

Mass Inflation and Launches

The period before a mass inflation presents an ideal opportunity for a random inspection and monitoring of balloons, crews and equipment. Take time to note any deficiencies or rule violations. If immediate action is required to ensure safety, advise the pilot of the corrective action necessary.

- Ensure balloons that appear to be damaged are in airworthy condition. Pilots of un-airworthy balloons will not be permitted to fly by the Balloonmeister in consultation with the Safety Officer. The local Aviation Authorities may be notified, if necessary, to prevent operations of un-airworthy balloon.
- The Safety Officer should possess an understanding of manufacturer's 'acceptable levels of damage' when investigating balloon damage and be acquainted with local and National Ramp Check guidelines.
- The Safety Officer, in consultation with the Balloonmeister, has the right to prevent a balloon from taking off, as part of any event, if they believe that the flight could be unsafe due to the visible condition of the balloon.
- If there is an unanswerable question concerning the airworthiness of a balloon, it should not be allowed to fly until everyone is satisfied the balloon is in fact airworthy.
- Not only in mass inflation, but always, be sure the balloon and basket are tied-off with proper knots or/and carabiners, not to the trailer, but directly to the retrieve vehicle.
- The pilot must be sober, free from drugs and in good health.
- On occasion FAA personnel may seek to perform Ramp Checks on launch fields. The Safety Officer should have a clear understanding of when is the proper time to do a ramp check and be able to communicate that to any FAA personnel in a clear but polite manner.

In-Flight and Landing Phase

An effective Safety Officer should not be a participating pilot and remain mobile and in constant communication with the Balloonmeister or have an assistant remaining on the ground serving this important safety function. After launching balloons from a common launch field or release of pilots after the Pre-Flight Briefing, the Safety Officer, or assistant, should go to the outlying areas where pilots will be seeking individual launch areas. Launch safety and courtesy should be monitored. Landowner relations should be monitored in conjunction with the Landowner Relations Officer.

Once in the air, the balloons should be followed along the flight path while monitoring the progress of flight operations. Any indication of unusual or reckless flying behavior should be noted for subsequent follow up. As the landing phase begins, the Safety Officer should be in a position to monitor the landings with safety and landowner relations a top priority. Any assistance needed or requested by pilots should be provided to the extent of one's ability.

The Safety Officer should remain in the landing area and continue to monitor landings until he can best determine that all balloons have landed safely. Throughout the landing process the Balloonmeister should be apprised of the situation and advised when the last balloon has landed.

Safety Officer Responsibilities at the Scene of an Emergency

The Safety Officer's duties at an emergency or an accident include:

- If not at the scene of the accident, proceed to the scene when directed by the Balloonmeister. If first to arrive at the accident scene, evacuate all persons and public and inform the necessary rescue services.
- Report all accidents, incidents or emergencies immediately to the Balloonmeister.
- Render assistance at the scene as needed.

Note all relevant information or evidence (see Appendix H) that may help the Director or the authorities in any investigation. Ensure no evidence is removed or tampered with before the FAA and/or (National Transportation Safety Board (NTSB) arrive, if applicable. If possible, assign to a responsible person the duties of listing of eyewitnesses' photos, videos etc. The Safety Officer may represent the Balloonmeister, Officials, and the Organizer at the accident scene. Be professional, helpful and honest to forward a positive relationship with all authorities involved.

Refueling – Propane Site

The Safety Officer should monitor the propane-refueling site before and during the Event. This will help ensure propane rules and procedures are being followed by all pilots, crew, volunteers and propane suppliers. See Appendix G for an example of event propane rules.

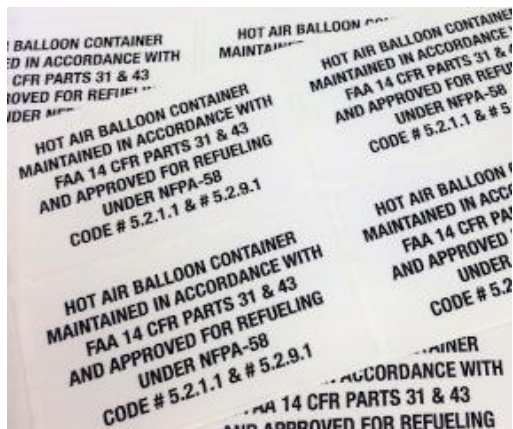
If the Safety Officer finds the setup of the refueling site is contrary to safety requirements, he may, in concert with the Balloonmeister, request implementation of changes. In all situations, organization and control of the propane refueling area should be in conjunction with local fire department officials and regulations. It is of great importance that safety equipment such as proper gloves, fire equipment and an emergency shutoff are present. Also ensure that proper fire extinguishers or fire vehicles are present at all refueling times.

For refueling, the basket containing fuel cylinders or the cylinders themselves should always be taken out of an enclosed trailer or retrieve vehicle unless the trailer has adequate ventilation (back and side door and installed vents). Each event should determine what their local propane supplier and fire marshal require. Pilots and crew should never be permitted to refuel while standing inside the balloon basket or while restricted to a confined space in any manner. Propane refueling accidents can be disastrous and extreme care must be exercised throughout the refueling process.

I certify that _____
has received proper training in the safe handling & refueling of Hot Air Balloon LPG Gas Containers in accordance with NFPA-58 code #7.2.1.4 & #4.4.
Signed: _____
Pilot Cert #: _____ / / _____
Date
Valid for 5 years from date of signature.

The National Fire Protection Association (NFPA) issued new regulations impacting propane fuel cylinders used in hot air ballooning in 2017. Pilots, crew and Organizers should be familiar with its requirements as it impacts refueling of hot air balloon fuel cylinders.

Fuel cylinders used in hot air balloons must have a sticker indicating that the cylinder complies with FAA 14 CFR Parts 31 and 43 and that said cylinder is approved for refueling under NFPA-58. The stickers shown below are available from the BFA store for a nominal charge.



Individuals refueling propane cylinders must have proper training in the safe handling and refueling of propane cylinders. A pilot's certificate is evidence of such training, but crew must have some sort of documentation as to their training. The card depicted above has been approved for that purpose and these are available from the BFA Store at a nominal charge.

Additional Duties

The Safety Officer may assist the pilots, officials, sponsors, or the general public in any way which will make the event safe, successful, and enjoyable.

In the event of an incident or accident, the Safety Officer acts, with other officials, to ensure that contact with the public, the FAA, and other regulatory agencies accurately reflects the facts of the case, and that the interests of the pilot involved and of the FAA are protected. Accidents are defined by National Transportation Safety Board, 49CFR

§830.2. When possible, the Safety Officer should interview the pilot-in-command involved in the accident. See Appendix H for a suggested incident and accident report form.

3.6 Development of an Emergency Response Plan

As discussed in Chapter 2.5, working in concert with the Event Organizer and Balloonmeister, an Emergency Response Plan should be developed for balloon events. The objective of any safety program is to avoid balloon accidents and to minimize the potential for personal injury and property damage. This goal can only be achieved by an understanding of the principles of flight safety and the conscious elimination of unsafe acts and conditions.

The object of an Emergency Response Plan is to control an emergency situation involving a balloon, multiple balloons, retrieve vehicles or pedestrians. A briefing will be held prior to the pilots' General Briefing with all people involved with the plan. This meeting will usually be held immediately after the officials briefing. There are many considerations when formulating the Emergency Response Plan for an event. These include:

- Who is in the communications loop during an emergency?
- What is each person's responsibility?
- Use of code words for minimum disclosure.
- Managing the crowd (if applicable).
- Managing the press.
- Managing the other pilots and crews.
- Managing the Organizer/Sponsor.
- Post emergency meetings.
- Post emergency statements.

The Balloonmeister, or his designated assistant, will take command of an emergency situation. This should be understood and agreed upon with the Organizer/host/sponsor, etc. before the start of the event.

Emergencies can occur in the vicinity of the launch field or in the countryside. When an emergency occurs in the countryside the event spectators, generally speaking, know nothing of the occurrence until they see it on TV or read about it in the papers.

If, at a large event, where there is a public-address personality, it is essential that he be briefed on what to do in the event of a disaster at the launch field. Nothing could be worse than giving a graphic blow by blow description of the disaster to the spectators.

There are various types of emergencies that may have to be dealt with including:

- Landowner problems
- Accident with injuries
- Accident with fatalities
- Refueling accident

Upon report of an emergency, the Balloonmeister will make, or arrange for, the necessary announcement and phone calls to enable assigned people with the flight operations staff and the Organizers' staff to be called together to be briefed and sent to their respective positions to handle the situation. If an announcement has to be made, it is better done in code. Several codes can be used, either a straight message such as "The Red Fox is Home" or code numbers such as "Code 18". If there are several codes, make sure they are different enough that no one will confuse them.

Upon the prearranged command or announcement, the following people would typically meet in the Balloonmeister's Operations Center or another designated place as instructed:

Balloonmeister
Safety Officer
Landowner Relations Officer
Event Organizer's Representative
Public Relations / Media Representative

Law Enforcement Representative
Others as instructed

The Balloonmeister or his assistant will take charge of the emergency plan. The Safety Officer will go to the scene of the accident. If the Safety Officer is off-site he may receive instructions from the Balloonmeister via cell phone.

The public relations/media representative will communicate with the media to name the emergency situation spokesperson and advise when and where the news conference will take place. It is very important to talk to the press as quickly as possible, and to keep them informed. Tell them what is known, but **DO NOT SPECULATE**. In the immediate aftermath of a crisis event, a good model to follow would be to report what is known, what is not known, and where to go for more information. Here are some helpful examples:

1. Tell them what is known. Use only known, verifiable facts, i.e., "A balloon has gone down. It was carrying a pilot and three passengers. Emergency personnel were on the scene immediately. All four people have been taken by ambulance to Willow Glen Hospital."
2. Tell them what is not known at the present time. In many cases, this can be extremely important information, and the media will be asking anyway, i.e. "We do not have the names of the passengers nor their condition, nor the nature of their injuries."
3. Tell them where to go for more information. This can be as simple as "I'll be back here in 15 minutes and hope to have more information at that time" or "our website will be constantly updated with more information available for public release."

The press will do their best to obtain, in the form of speculation, more information than may be known. Be polite yet firm; report only the facts as known. Avoid divulging information which is even remotely speculative, or information that would be personal in nature. That includes the name of the pilot or affected parties before next of kin have been notified. Questions concerning medical condition or injuries should be directed to the hospital, it's important to respect the privacy of individuals.

A Federal Aviation Administration representative may be on site as a monitor. At many events, the Safety Officer or Balloonmeister performs this function. The Aviation Authorities are to be kept informed by the appropriate person on the event staff.

After an emergency, there will be rumors. The Balloonmeister must keep this under control by deciding what to tell, and when, at future briefings. The goal is to "get on with the event" without dwelling on the past during pilot briefings.

A good Balloonmeister is **ALWAYS** available, 24 hours a day. Someone knows where he can be reached at any time should there be an emergency. He should not be off flying the task/flight and unavailable if he is needed at a moment's notice. The Balloonmeister is to be advised of all emergencies. He will then consult the appropriate personnel and decide the course of action. A meeting will be called as appropriate. The people concerned will be called over the telephone or by announcement on the PA system depending on the circumstances. An example of such announcement is: MR ANDERSSON TO THE HQ.

When this announcement is made, all persons will meet in the Balloonmeister's Operations Center. Depending on the type and extent of the emergency, the Balloonmeister may have already dispatched members of the team to the scene to get an up to date report during the meeting. All personnel will be given their assignments for the particular situation at hand and the Balloonmeister will advise of time and place of any further meetings.

3.7 Launch Director and Field Marshals

The Launch Director and Field Marshals work under the direction of the Safety Officer. The Launch Director's primary duty is coordinating the Field Marshals under his direction while ensuring the safety of the launch at common launch areas. The Launch Director has control of the launch during any 'mass ascension' and is usually assisted by Field Marshals. It is normal for all people involved with the launch to wear bright safety vests or some other type of distinctive apparel that is easily recognized.

While it is desirable for the Launch Director and Field Marshals to be LTA pilots, it is not necessary. It's important to note that a properly trained non-pilot can perform this duty. Field Marshals should be well-trained and able to work as a team with the Launch Director and the Safety Officer.

Pre-Flight Operations

If the event wants to map out designated launch spaces or grids for each participating balloon, the Launch Director should prepare a layout of the launch field for mass ascensions. Depending on the size of the launch field and number of participating pilots, it may be advisable to mark balloon positions with some kind of markers, for example, survey flags, banners, placards, tires etc. Providing for surface winds in a 360° radius, an area of approximately 100' X 100' should be allowed for each balloon. A map of the field layout should be given to all pilots at the pilot briefing.

The Launch Director will be available for all pilot briefings to assist the Balloonmeister with questions regarding the launch and the launch field. All Field Marshals should be introduced at the General Briefing and a description of their apparel given.

Safety and good communications are essential at all mass launches. Any sources of potential problems should be immediately reported to the Launch Director, who will be in constant communication with the Safety Officer and Balloonmeister.

Prior to the launch window opening at mass launches, Field Marshals should talk to known inexperienced pilots or those new to the event to determine the pilot's plans for launch. They may prefer not to launch during peak launch times but wait until there is less congestion. During any balloon event, pilots with inflated balloons should only be held to facilitate orderly and safe launch conditions.

Each Field Marshal will be assigned specific balloons for the launch. This prevents confusion on the launch field. Specific cases sometimes require the Launch Director to assist a Field Marshal or to put an experienced person next to a 'first time' Marshal for assistance.

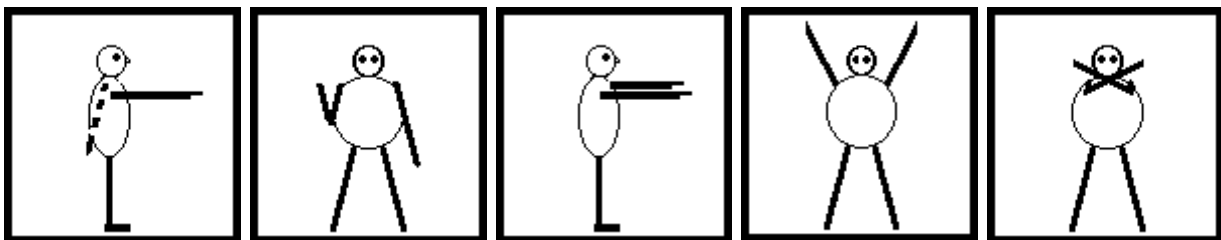
Field Communication

Small hand-held radios can be useful for communications between launch personnel before and during the actual launch period.

It is very important that when a pilot signals the Field Marshal that he is ready to launch, he is completely ready and at full equilibrium. The Balloonmeister will usually make this point several times during pilot briefings.

At the opening of the launch field and raising of the green signal flag, the Field Marshals should use hand signals as shown below to communicate with the pilot. BFA competition rule 9.17.1 states: *"Launch Directors, if utilized, will give each pilot permission, either verbally or with hand signals, to take-off. The pilot may then take-off at will, subject to any instructions from the Director/Marshal at the time."*

Hand signals, if used, will follow those shown below.



I acknowledge your readiness to launch.

Stay on ground; follow instruction of my right hand.

I'm going to clear you for take-off.

Clear for take-off

Cancel all previous instructions. Wait.

Field Marshals should be positioned beyond the perimeter of the balloon to verify the position of other balloons in the area, both arms stretched out and with the palms down. When the Field Marshal releases the balloon to take off, he raises both hands above his head, pointing upwards. This procedure is to be explained at the general briefing.

Field Marshals should keep launching pilots informed on the location of nearby balloon traffic. The worst possible scenario is to launch the balloon while standing next to the basket. It is impossible to see what is above when standing at the basket.

Launch Sequence

There are basically two ways to launch balloons, and, to some extent, it depends on the type of event as to which is used. The first is to launch all downwind balloons first. The second is to launch balloons at random as they are ready to go. Both methods are used, successfully and safely.

It is more common to launch at random with a large or congested field. Pilots want to launch when they are ready, not when balloons downwind of them have been launched. It should be clearly understood that for random balloon launching, a Field Marshal's job becomes more difficult. Both Launch Director and Marshals need to work closely together to ensure that no balloon is launched up into a balloon passing overhead. It is also important to be sure that once they have launched, balloons climb to a minimum of 500 feet to clear the launch area.

Depending on the nature of the event, speed in launching may be important, but with great care, it is often possible to allow a second wave of balloons to layout as each balloon launches. Cooperation between pilots, crews and officials is an important factor on a busy launch field to enhance safety. Every launch area will vary in size, shape, prevailing wind, tree cover and obstacle location. The most important thing for launch personnel to keep in mind is to always have control over the safety of the launch.

3.8 Scoring Officer (generally only used in competitive events)

The duties of the Scoring Officer are to ensure that the proposed and actual event conduct is fulfilled fairly, and that the results of the tasks flown at the event are accurately and completely reported. The Scoring Officer must be familiar with the applicable rules, for example the BFA/HACD Sanctioned Competition rules, related penalties for observed and documented violations, and scoring procedures. The Scoring Officer shall not be a competing or flying pilot at the event.

The Scoring Officer is ultimately responsible for all elements of observing, measuring and recording results for each task called by the Balloonmeister. He must develop a plan to control each of the scoring areas and ensure that measurements are precise and made in accordance with the applicable rules.

Pre-Event Activities

After a Scoring Officer has been assigned to an event, it is his responsibility to review the organizational plan as presented by the Event Organizer and Balloonmeister to determine that there will be sufficient personnel to cover the tasks planned.

The Scoring Officer will specifically check to be sure that the Organizer has remembered to take care of the following details:

Posting Board: There should be a central posting location where notices of pilot's meetings, task results, lists of check-in numbers and messages for individual pilots can be posted. It is ideal to have a room or lobby area reserved for pilots for the duration of an event, and the posting board would be in this area. In any case, it is essential that all pilots know of one source for information that they can check whenever there will be meetings, etc. The Scoring Officer will consult with the Balloonmeister in regard to this matter.

Required Pilots' Meetings: The Organizer should be reminded that there shall be a meeting of all pilots and officials prior to the beginning of any tasks. The purpose of this meeting includes introducing personnel, selecting the protest jury, etc. The Organizer should inform competing pilots of this meeting either by mail when they confirm a pilot's entry or during on-site registration of all pilots.

Maps and Charts: The map supplied by the Organizer to all pilots and officials shall be the official competition map. The map should be checked for accuracy and scale. If cost prohibits supplying this map to balloon recovery crews, they should be supplied with county or area maps by the Organizer.

Measuring Devices: Remind the Organizer that there needs to be adequate means for measuring distances and depending upon the types of anticipated tasks, measuring angles. The BFA recommends at least one device for every 15 competitors.

Markers and Targets: The markers and targets, provided by the Organizers, must conform to the descriptions detailed in Chapter 2.8.

Hare Streamer: Identifying streamer for use by Hare balloon in Hare and Hound Task. Recommended size is: .5 m (2 feet) by 5 m (16 feet) long. Frequently, one leg of the target is used.

3.9 BFA Scoring Software

The BFA's Hot Air Competition Division is responsible for the development and maintenance of the software that can be used for scoring competitive balloon events. This software is available without charge to any event and Event Officials. The software is available for download at <https://bfa.net/index.php/tools-for-event-organizers/bfa>.

3.10 Landowner Relations

The Landowner Relations Officer should be an individual living in the flight operations area possessing at least a basic knowledge of balloon flight as well as launch and landing requirements. Much of the landowner relations work is performed before the event. Specific duties include:

Pre-Event

- Document all known Prohibited Zones (PZs) including landowner's name, address, phone number, reason for restriction and altitude boundary (if applicable). Prepare an outline of the property for inclusion on the event pilot map.
- Communicate with local School Boards and Park Districts to seek permission for balloon launches.
- Review the flying area and note locations of exotic animals or any large concentration of horses, cattle, pigs, poultry and deer farms.
- Develop a plan to encourage strong landowner relations throughout the event including specific guidelines and policies. See Chapter 2.7 for specific guidance.
- Develop landowner certificates of appreciation for pilots to give to landowners thanking them for allowing event pilots to use of their property. Some events gather the landowner's name and address for inclusion in a drawing at the conclusion of the event for an award such as a US Savings Bond.

Event Activities and Responsibilities

- Be present at General Briefing for introduction as it is important for participating pilots to know who to advise of landowner concerns.
- Throughout every flight, travel to any remote pilot launch areas to monitor any potential landowner issues. Assist pilots as needed and converse with landowners.
- Follow pilots along their flight paths and monitor adherence to any PZs.
- As pilots begin the landing phase, assist pilots as needed and work with landowners to ensure they are satisfied they have been treated in a courteous manner.

3.11 Sponsor and Passenger Ride Coordinator

Many events offer a balloon ride as part of the sponsorship package and some events use paid passenger rides as an enticement to attract pilots to their event. Organizing and managing rides for these two groups requires a specialized knowledge of the various forms required including: Passenger Data Sheet, FAA Waiver and Designated Flightcrew Acknowledgement (if applicable), Assumption of Risk and Waiver of Liability, Passenger Briefing Acknowledgement, Boarding Pass, etc. The coordinator must be familiar with each of the pilot's experience level and, if not, work with the Balloonmeister to prepare a list of those pilots most qualified to carry sponsors and VIP's.

The Passenger Ride Coordinator is responsible for developing a plan, including equipment and support personnel, to handle paid passengers and sponsors for flight. It is recommended that the following questions be addressed prior to the Event, with the Event Organizer:

- What are the maximum available flights and are sponsor rides required?
- How many sponsor slots (if required) per each individual balloon?
- When are sponsor rides (if required) to be flown (i.e. first available flight, first passenger counted as a sponsor by the festival, etc.)?
- What is the price to charge for each paid passenger and what amount will the pilot receive?
- What is the process to follow for uniting passenger(s) or sponsor(s) with their assigned pilot?
- What forms or documents must a passenger read, understand and sign?
- What forms require passenger signatures? Remember legal guardian signatures for underage passengers.
- If there is a screening process for passenger suitability (health, intoxication, etc.), what are the requirements?
- How are passengers from cancelled flights handled (i.e.: reassigned; refunded; etc.)?
- Will the event accept advanced booking for flights in the weeks or month(s) before the event? If so, will confirmation letters, ride vouchers, parking passes, event entrance tickets, etc. be provided as part of that process?

Please keep in mind a private-rated pilot is not allowed, by FAA regulations, to fly a paying passenger.

The Ride Coordinator's plan should also include the following:

- Review pilots experience levels and determine if any of the pilots should not carry a sponsor or VIP passenger. It may be better to assign two passengers to the more experienced pilots in an effort to allow the lesser experienced pilots gain more experience.
 - An on-site plan for checking in prepaid passengers, sponsors, and new passengers.
 - An equitable plan for assigning passengers (sponsors included) to each balloon.
 - Ensuring passengers read and sign the festival's passenger release of liability/waiver, designated flightcrew acknowledgement, etc.
 - If an FAA Waiver is in place, ensure the passenger reads the provisions of the Waiver and attends the pre-flight pilot briefing.
 - How paid passenger monies will be distributed to the pilots (e.g. after each flight; upon receipt of passenger boarding passes from the pilots, pilots collect the monies directly from the passengers, etc.).
 - Procedures for pilots providing updates to the number of passengers and/or maximum total passenger load (weight) available for each flight window. Remember, temperature can affect maximum weight limit.

Chapter 4

Weather Considerations

4.1 Chapter Overview

The requirements of the Federal Aviation Regulations (FARs) 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.

4.2 Expectations

Balloon events are, by their very nature, a fair-weather activity. While pilots and event officials are well aware of this, it is important to establish this expectation with the Organizer and sponsors early in the planning and coordination process. Expectations need to be consistent with the potential that events may be limited or cancelled due to weather conditions. These reality-based expectations should be fully understood by the event Organizer and all sponsors. All contracts, verbal or written, should contain language explaining the fair-weather nature of hot air balloon events. See Section 2.2 Event Organizer Responsibilities, Sponsor Relations as well as Appendix A, Letter of Understanding.

4.3 Impact of Weather

Uncooperative weather can have a major impact on the safety of operations, on sponsor reactions and on the overall success of an event. Balloons are simply “bubbles in the air” and are vulnerable to winds, moisture and turbulence. Studies have shown that most accidents will include some aspect of weather as a cause or as a contributing factor. For this reason, it is critically important to understand the weather, share all information about the weather, and to respect even marginal conditions that might endanger the pilots, passengers and spectators. Sponsors are commonly promised, even contracted, that their logos will be displayed, that their personnel will receive rides, or that there will be some other event visibility in exchange for their contributions to the event. In the case where poor weather interrupts the event, the promised sponsor benefit may not be completed and the sponsor may be upset. In fact, the overall success of the event can be jeopardized by adverse weather. Effective communication in advance between the event staff and the sponsors regarding the possibility of adverse weather can go a long way to preventing ill-will.

The impact of the weather should be considered early in the event planning. Using climatological information (historical statistics) can help the Organizers establish the season or month that optimizes the best chance for success. Climatological information for many locations throughout the United States is available from the National Centers for Environmental Information (NCEI) and the local National Weather Service (NWS) Office.

Referring back to the “bubbles” analogy above, hot air balloons are certainly susceptible to winds at the surface or aloft, but other variables influence, or are influenced by, the wind. For example, localized temperature gradients (due to weather fronts or “micrometeorology” and terrain) can influence the general wind direction and speed as well as cause wind gusts. Above the surface, the vertical temperature profile or temperature lapse rate and temperature inversions can cause changes in the wind characteristics throughout the flight time. Large-scale cloudiness can certainly impact a balloon event, but large-scale patterns are usually fairly predictable. Localized small-scale convection will often contribute to clouds and rain showers or other abrupt weather challenges that may not be captured well in forecast models, if at all. Therefore, the Weather Officer of an event needs to stay abreast of the latest information, monitor conditions during flight and/or tethered operations, and alert appropriate officials if unexpected conditions arise.

4.4 The “Weatherman”

One of the important steps Organizers need to take is to select a competent meteorologist or Weather Officer, familiarly called “the weatherman”. The individual chosen should have substantial meteorological knowledge and experience to aid with decision support and to help the Organizers anticipate and capitalize on the conditions for the event keeping in mind safety, planned flight and spectator activities. This situational awareness and experience is important because it provides understanding of the “big picture”, and helps the other officials interpret many of the formal sources and terminology found within the discipline.

Further, the weatherman should have experience with the sport of ballooning. The effect that a certain weather condition may have on balloons may not be appreciated by someone skilled only in weather phenomenon but unfamiliar with balloon systems and flight characteristics. For example, a 10 mile per hour (8.5 knots) surface wind is a pleasant breeze, but for balloonists it is toward the upper threshold of what is tolerable for tether or a flight. In addition, it is important that the individual have an appreciation of the local area. Understanding broad weather patterns is not adequate for properly defining conditions at a launch site or within the local flying area. Knowing the local area and relating the broad conditions to the time and place of the ballooning activities is referred to as micrometeorology and is the mark of a skilled weather official. Additional discussion of important aspects of the Weather Officer is included in Chapter 3.

4.5 Weather Information

It is important to realize that a balloon event is a very local and time-limited activity. The balloons will commonly fly twice a day; first, soon after sunrise and then again before sunset to minimize the effects of thermals and to take advantage of the lighter winds that normally exist at these times. The balloons will fly within a radius of 10 to 15 miles from the event headquarters and a flight usually takes no more than two hours. While the weather officers need to focus on the synoptic-scale to get the general trend in the forecast, they also need to focus on the micro-scale capturing the events that will impact the flying area through the flight window. This includes the knowledge of local effects from orographic phenomenon.

When preparing the weather briefing, the Weather Officer should only give a short synopsis of the general weather situation and then concentrate on providing the data for the area and time of the flight. For balloon pilots, the most important variable is the wind (direction and speed). The objective is for pilots to make best use of the different wind directions with altitude to reach a certain target or appropriate landing areas.

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) weather 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 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 is available via the telephone and Internet. The BFA web site contains articles on weather as well as several links to sources of weather information available at: <https://bfa.net/index.php/information/weather>.

There are also a number of web sites providing valuable information for balloonists including:

www.wunderground.com
www.usairnet.com
www.ballooncast.com
www.ryan-carlton.com
www.erh.noaa.gov/buf/bufkit/bufkit.html
www.aviationweather.gov/gfs
www.windy.com
rucsoundings.noaa.gov

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.

An ‘official’ weather briefing should be provided to all participants prior to any flight or related activity. It’s important to note that this information is provided for the convenience of the participating pilots and in no way does it supersede the pilot’s need to gather all pertinent weather information for the flight as required by the 14CFR § 91.103. The pre-flight briefing should include all pertinent weather information available from flight service. At a minimum, the briefing should include:

- The weather synopsis or large-scale overview of the weather
- Current wind conditions on the surface
- Forecast wind conditions on the surface
- Forecast winds aloft
- Rapid Refresh Model (RAP, formerly the Rapid Update Cycle [RAP] Model) Vertical Profile
- Real time analysis of winds aloft using VAD winds, if available/applicable for the flight area
- Temperature and dew points
- Cloud layers and ceilings
- Probabilities of precipitation
- Real time radar and analysis of the potential for thunderstorms
- Any pertinent SIGMETs, PIREPs, NOTAMs, weather advisories and TFRs

4.6 Time Schedule

The Balloonmeister usually starts preparing the flight one and one-half to two hours before the scheduled briefing time. At this time the Balloonmeister will need a rough briefing from the Weather Officer telling him the expected weather situation and anticipated wind direction and speed at various altitudes. Thereafter, the Balloonmeister will consider flight details, tasks, etc. and will begin to organize and prepare the Flight (Task) Data Sheet. In the interim, the Weather Officer should refine the forecast, establish a wind reading, and prepare the Weather Information Sheet.

The Weather Information Sheet should be finished and ready to be duplicated not later than fifteen minutes before briefing time. The Weather Information Sheet should be provided to the Balloonmeister before duplication.

4.7 Equipment

The Weather Officer should have at his disposal several tools to best take advantage of the various sources discussed above, as well as make specific observations at the launch area. There must be telephone capability. With the extensive use of cell phones this is generally not a problem except in the most remote areas. Internet access is also important. The Internet provides current aviation observations, forecasts, weather radar and meteorological satellite images, weather watches and warnings, AIRMETs, SIGMETs, and local “unofficial” observations.

While it is useful to have a theodolite in order to follow pibals and get accurate readings of observed wind speeds and direction recorded at 200-foot increments, it is expensive and not a readily available piece of equipment. The Windsond (windsond.com) is a more moderately-priced solution but may still not be affordable for small events. There are, however, affordable software programs that can be used in conjunction with a compass and clinometer that offer an affordable alternative for doing wind readings.

Finally, it is important to monitor automatic reporting stations in the area in order to detect possibly changing conditions. At large events it may be helpful to invest in one or more local weather stations to provide real-time surface temperature, humidity, pressure and wind observations for areas likely to be included in the flying and landing operations areas. If this type of sophisticated equipment is not available to the officials, the use of RAP model wind profiles and VAD winds (if applicable) are essential to any weather analysis.

4.8 Chain of Command

The Weather Officer must have direct communication with the Balloonmeister and Safety Officer. Changes in weather conditions need to be relayed and reacted to in a timely manner. Events may be modified or even cancelled on the basis of weather situations. It is important that the Weather Officer have a high degree of self-confidence and the ability to inform the Balloonmeister and Safety Officer of impending adverse conditions.

As discussed throughout this publication, event officials must report to the event Organizer but the decision-making process regarding balloon flight must remain independent and the decision to open the flight window belongs solely to the Balloonmeister acting in concert with the weather and safety officer. All individual go/no-go decisions, however, are made by the pilot in command.

4.9 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 damage to a balloon system 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 result in 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 wind conditions can be a risk because the balloon pilots have no ability to steer away from ground hazards or 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. Fast winds at 200 feet above the surface can create problems for 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. A wind shear typically accompanies temperature inversions where the wind speed and direction can be very different at the boundary 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 (significant meteorological information) 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 Convective Inhibition or CIN (see Glossary). 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. The CAPE-CIN relationship is an excellent indicator of potential thunderstorm activity.

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-facing 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.

Problematic Weather Situations

Everyone can see when the weather is very good or very bad, but the situations in between are where a good Weather Officer is most important. It is the Weather Officer's responsibility to always inform the Balloonmeister candidly and objectively about the situation and the Balloonmeister will then decide to fly, cancel or postpone.

Sometimes the Balloonmeister will move the competitors to the launch field and will call for an extra (supplemental) briefing there. The Weather Officer's presence is necessary at these supplemental briefings to update the Balloonmeister with the latest developments. Try to make arrangements to have access to your information sources by telephone or otherwise when attending these supplemental briefings at the launch field. Internet connections are now readily available with the widespread use of cell phones with browser capabilities as well as laptops and I-Pads with Internet connectivity.

4.10 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. Each balloon manufacturer also has a recommended maximum surface wind for take-off. That information can be found in the aircraft's operating manual.

Critical Weather Variable	Possible Range to Consider
Surface Wind Speed (<i>maximum</i>)	10-11 knots considering flight direction and landing areas available
Wind Speed 200'-400' (<i>maximum</i>)	12-14 knots
Wind Speed 400'-600' (<i>maximum</i>)	15-17 knots
Wind Speed 600'-800' (<i>maximum</i>)	18-20 knots
Ceiling (<i>minimum</i>)	1,500' – 2,000' (must also consider Airspace Class and § 91.119)
Visibility (<i>minimum</i>)	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 event officials 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 event should develop on their own after consultation with the event's Balloonmeister, Weather and Safety Officers.**

Parameter Particulars to Ponder

Conventional wisdom generally considers ten knots as an upper limit to demonstrated surface winds. Sometimes, in some areas and at some events, that limit may more appropriately be eight knots or as high as twelve knots depending on the possible wind breaks afforded at the 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 shears 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/or 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 a few 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 (above ground level) and a stand-up landing.

Ceilings and Visibility

Ceilings and visibility are two of the most critical components of a safe flight. Developing a knowledge of current conditions and possible conditions during the flight window require close monitoring of atmospheric conditions. Developing a working knowledge of Skew-T diagrams will help the pilot and officials determine if low ceilings and fog might develop after sunrise. The horrific 2016 accident in Lockhart, Texas is an example of ceilings deteriorating quickly causing unsafe flying conditions.

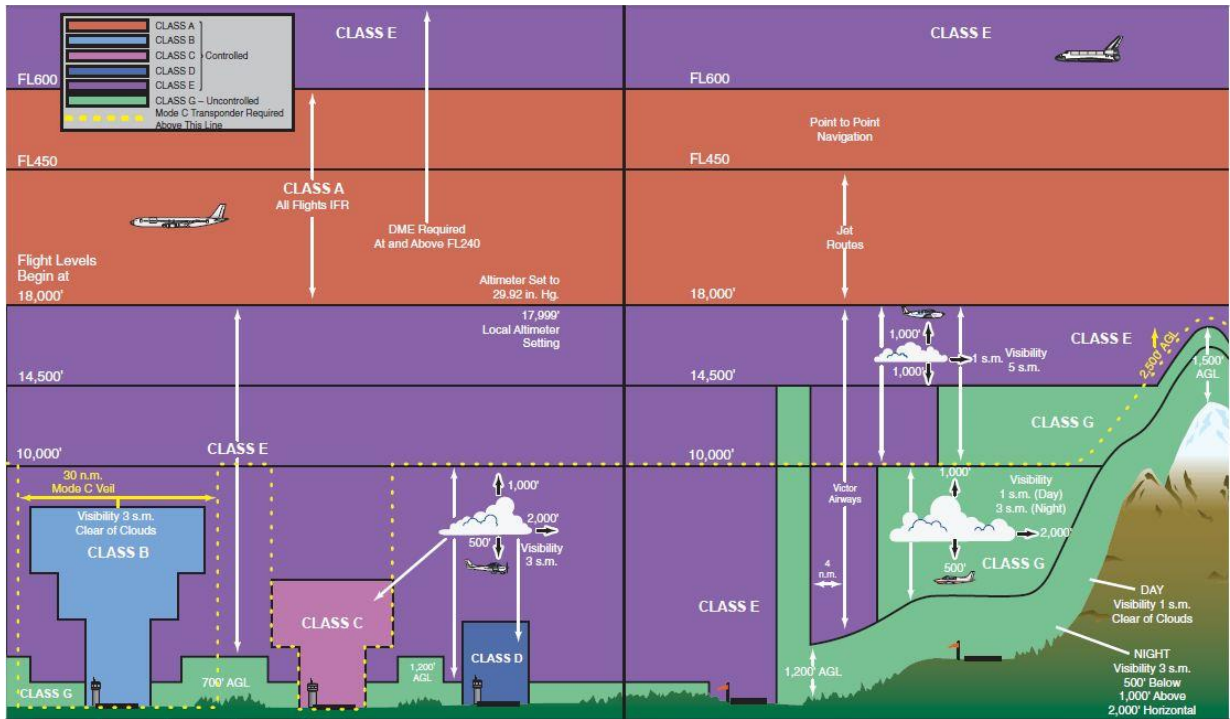
For aviation purposes, a 'ceiling' is defined as the lowest layer of clouds reported as being broken (more than 50% coverage) or overcast, or the vertical visibility into an obscuration like fog or haze. Consider that 14CFR § 91.119 requires flight at 1,000' (or 500' if operating under a FAA Waiver) above the highest obstacle within a horizontal radius of 2,000' of the aircraft in congested areas. When operating under an FAA Waiver or over other than congested areas the altitude above the highest obstacle is 500'.

Given the above and considered in conjunction with 'clear of clouds' requirements outlined below, the absolute minimum ceiling when operating under a Waiver is 1,000' AGL and 1,500' otherwise. Conventional wisdom would generally dictate a minimum ceiling of at least 1,500' with a preference leaning toward 2,500'. Minimum clearances above clouds are not shown as they are rarely applicable in balloon operations.

Airspace	Visibility	Cloud Clearance
Class G 1,200' or less above surface, regardless of MSL altitude	1 mile	clear of clouds
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

Referring to the FARs 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 any balloon event. Two miles can be an acceptable minimum visibility, but officials must consider if pilots are flying into the sun. Straight line visibility of two miles may only provide for one and one-half miles or less diagonal visibility as required in balloon flight. The generally accepted minimum visibility for balloon events is two to three statute miles. Selecting the correct minimum requires careful analysis of the above variables.

Here is a graphic showing airspace and minimum visibilities and cloud clearances:



VFR Weather Minimums

Event officials and pilots must be aware of basic VFR weather minimums. These are outlined in 14 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.

Officials are encouraged to work closely with weather professionals in making real time decisions with any thunderstorm within a radius as large as 200 miles.

4.11 Weather Information – Event Briefing Template

Reporting of weather for balloon events takes on many looks depending on the Weather Officer, local conditions, Balloonmeister requirements, and technology available. It is recommended that weather briefings be in a written format. If the event size or available equipment does not permit providing each pilot with a written report, a standardized presentation format is still helpful for organizing the verbal briefing.

In an effort to provide a ‘standardized’ look to the weather briefing, a suggested format is provided in Appendix D. The Appendix also includes information on how to gather and locate the needed weather information included in the weather template. All the information should fit on one page. The information should include:

- A small synoptic chart showing the general weather information. Try to illustrate the location of the Event on the chart.
- A short description of the weather situation and outlook including the time of the start of convection in the morning and the end of convection in the evening.
- Tables for wind readings and forecasts including altitude, direction, speed and observation or forecast time.
 - The altitudes should include the reference AGL (Above Ground Level) or MSL (Mean Sea Level).
 - The direction should be in full degrees ‘To’ or ‘From’ and include the reference (G=Grid

North, M=Magnetic North or T=True North).

- The speed should be in full figures including knots (nautical miles per hour), m/s (meters/second) or km/h (kilometers/hour).
- If a change of direction is likely during the anticipated flight time, include this information.
- The barometric pressure information

4.12 The Weather Briefing

During the task briefings the Balloonmeister will ask the Weather Officer to explain the weather situation. When providing this information, the presentation should be to the point and non-technical. There is no need to read the information from the Weather Information Sheet as the pilots can read that themselves. When the weather is not good, and the flight is postponed or cancelled, the Weather Officer should take some more time to explain why and provide a general outlook on when conditions are expected to improve.

When the event has the ability to present weather maps showing frontal zones, radar plots, etc. with a projector (preferably 'live' from the Internet), that's fine and appreciated, but again try to keep the presentation thorough but brief. Generally, a weather briefing should not take much longer than ten minutes.

Chapter 5

Pilot Qualifications and Acceptance Guidelines

5.1 Selection Process

To have a successful balloon event, an Organizer will need to recruit the number and type of pilots that match the goals and organization of the event. Each event type: competition, ride-based or sport, requires a selection methodology when it comes to soliciting pilots for participation. Pilot solicitation may be made by **invitation only** or **general invitation offer**. There are various sources to obtain a pilot list such as use of the BFA member roster, consulting with local balloonists (if available) or contact with other non-competing festivals that may be willing to share their pilot list. Pilots may be selected on an individual basis or on a first-come, first-served basis, the latter is generally not recommended as it removes an amount of control over the acceptance process that most seasoned Organizers and Balloonmeisters prefer to maintain. Critical to either of the methods is the coordination between Organizer and Balloonmeister to evaluate and ensure that those pilots selected exhibit the desired characteristics sought for safety, skill set, cooperation, and presentation.

5.2 Application Process

Organizers must design an application form as well as add additional pages for the specific or unique needs of the event; it is recommended that this basic content shown in Appendix E be included:

- Pilot background and experience information
- Balloon information
- Insurance coverage and insurance carrier

In all cases, the event should require the pilot's insurance company to supply a certificate of insurance with the limits of liability, passenger coverage and time frame of insurance coverage. It is important to note that in most cases insurance becomes invalid when log books have been altered or equipment changes have not been properly noted or authorized in the log book either by the proper endorsement of the repairman or pilot as authorized by the manufacturer.

5.3 Determination of Pilot Experience Levels

There are two levels of an LTA (Lighter than Air Free Balloon) pilot's license: private and commercial. The private license is differentiated from commercial by one factor: The private license does not allow the pilot to do any balloon related activity for hire or compensation other than to ask for a pro-rata share of reimbursement of actual expenses (14 CFR, §61.113(c)); the commercial pilot can charge for balloon rides, banner flights, tethers and other flight related activities. Both ratings may have limitations. The usual limitation as noted on the license is that the pilot is restricted to a free balloon with an airborne heater (burner). Lack of that restrictive notation simply means the certificate holder can also fly a gas balloon (a balloon filled with hydrogen, helium or other lifting gas.)

While a private license is achieved by successfully passing a written exam and a check ride with a minimum of ten hours of instruction and flight time, a commercial rating with the same conditions requires further instruction and thirty-five hours of flight time. When extending an invitation and accepting pilots for an event, an event Organizer needs to establish acceptance standards working in conjunction with the Balloonmeister. Items to consider include whether to restrict the event to a pilot with a minimum number of hours, currency or level of demonstrated experience, or base each pilot's acceptance on the fact that the FAA has passed judgment on this pilot and issued a pilot certificate (private or commercial). The pilot's certificate indicates the pilot has successfully passed the required written test and demonstrated proficiency according to the respective certificate standards.

There is a perception that with more time in the air, the more experience a pilot has, the safer they may be. **It is, however, the quality of that experience that should be considered** yet that is probably the hardest variable to evaluate. It is a known fact that high-hour pilots do have accidents and incidents. It is a known fact that new and low-hour pilots also have accidents and incidents. While not being over reactive to this subject, it is safe to assume that a combination of the quality of instruction, number of recent hours logged, terrain flown, geographic location, size of balloon, competition flights flown, etc. all go into the makeup of a pilot's proficiency, safety, and decision-making skills. See Chapter 5.4 below for an analysis of balloon accident statistics pertinent to this discussion.

An example one might consider evaluating PIC hours relative to skill level can be demonstrated by the following:

Pilot Billy Flatland learned to fly in Kansas and has flown 100+ hours in his local area only. He has applied to fly in a balloon event in Denver, Colorado. All of his flying to date has been over level ground at altitudes between sea level and 2,000' MSL with continuous open fields at his disposal to land if needed. He now (if accepted) will be flying at altitudes of 5,000 to 8,000' MSL with winds that can range from calm in the valleys to 30 knots over the mountain ridges. It would be safe to assume that at this time he may not be a good candidate for this type of flying. Consider also the increased risks of flying sponsors and paying passengers when evaluating the pilot applicant's experience and skill set.

A restriction on the minimum number of hours or number of flight hours in the past year may be prudent. It is important to note, however, that the pilot's demonstrated proficiency for the nature and location of the event is much more critical than the mere logging of flight time. Of course, other conditions such as number of balloons, man-made structures and built-up areas, competition for large prize money, and landowner issues will all come into play. While it is the decision of the Organizer and Balloonmeister to make based on a number of variables many of which may be unique to the local environment and event, it might be reasonable to require a minimum number of piloting hours based on the event's complexity: Level 1, 2, or 3. While each event must set criteria based on their assessment of the event's risk factors, the following is offered as a suggested guideline for minimum PIC hours for each of the identified event levels:

- Level 1 – entry level: 25-50 hour minimum
- Level 2 – intermediate: 50-75 hour minimum
- Level 3 – advanced: 100 hour minimum

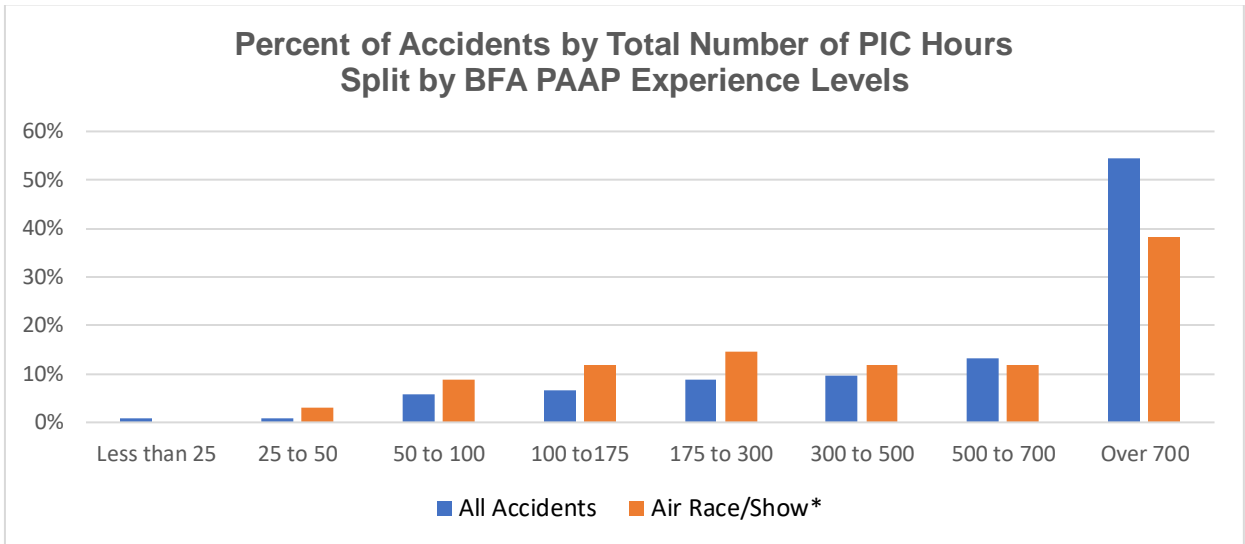
A question may arise from the body of pilots asking how one gets the required experience and hours in that type of event or geographical location if he cannot obtain admission to the event. The answer is to gain that type of flying experience with locals outside of the event or attending the event with other experienced pilots to gain the needed practical experience. Chapter 6.3 contains extensive discussion on the subject of pilot experience.

5.4 Balloon Accident Statistics

The following analysis was performed from data obtained from NTSB hot air balloon accident reports and statistics from 2005 to 2017 and reveals the following regarding accidents. While there are many statistics, the following seem pertinent to the discussion in 5.3 above. It is very important to note that these statistics are only for reported accidents; many accidents go unreported.

This 13-year analysis revealed the following:

- 148 accidents
- There were 143 serious injuries
- There were 116 minor injuries
- There were 29 deaths

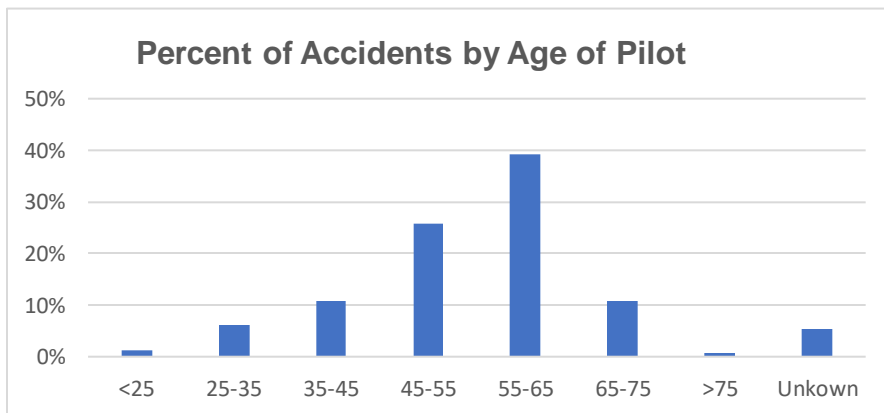


*Air Race/Show totals include five (3.4%) involving commercial rides provided at balloon events.

Accidents by PIC Hours

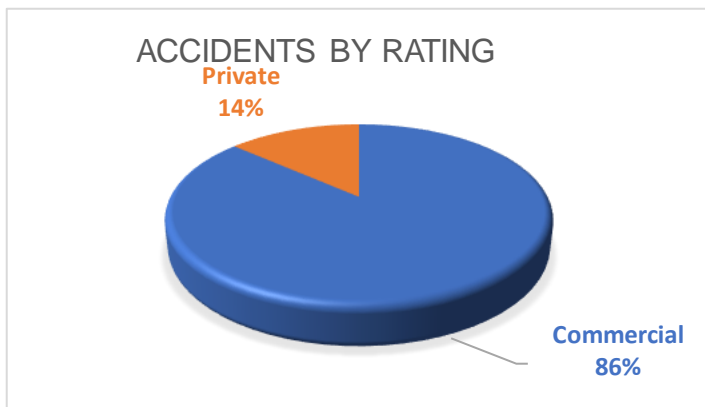
Balloon accidents (148) broken down by PIC hour intervals used in the Pilot Achievement Award Program (PAAP). The chart also analyses the distribution and frequency of accidents in total and at balloon events. Much could be conjectured about pilot attitudes as they climb up the chart in terms of PIC experience, but we'll leave that for another discussion.

It's difficult to draw meaningful conclusions from the above because we don't know the total number of flights of each of the categories. It may well be fair to assume that the majority of flights occur with pilots having more than 500 hours as PIC.

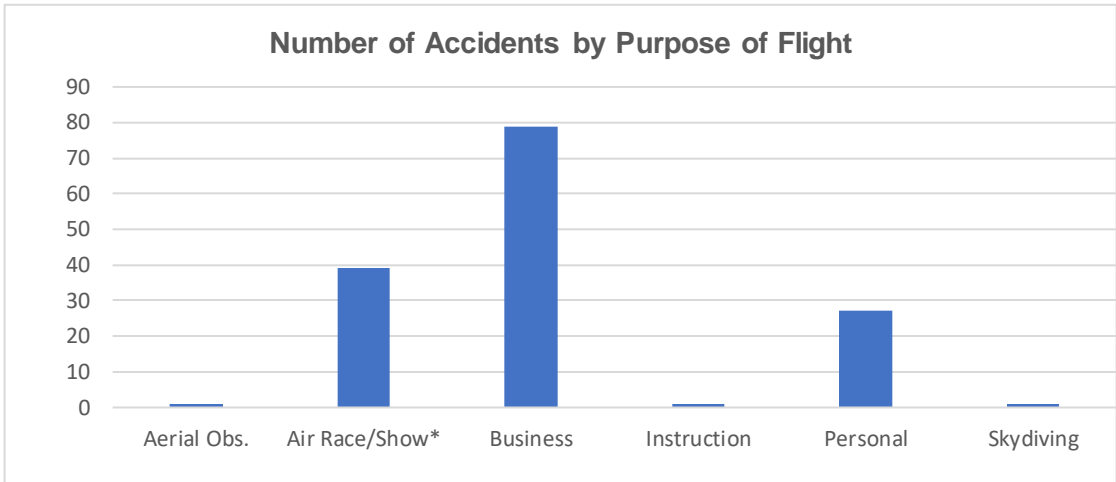


Accidents by Age of Pilot and Certificate Rating

The graphs of Accidents by Age of Pilot and Certificate Rating probably correlate to the graph of Accidents by PIC Hours. If one were to make a conclusion solely on this data, it would appear that commercial pilots over 45 years of age with 750 or more PIC hours were the most



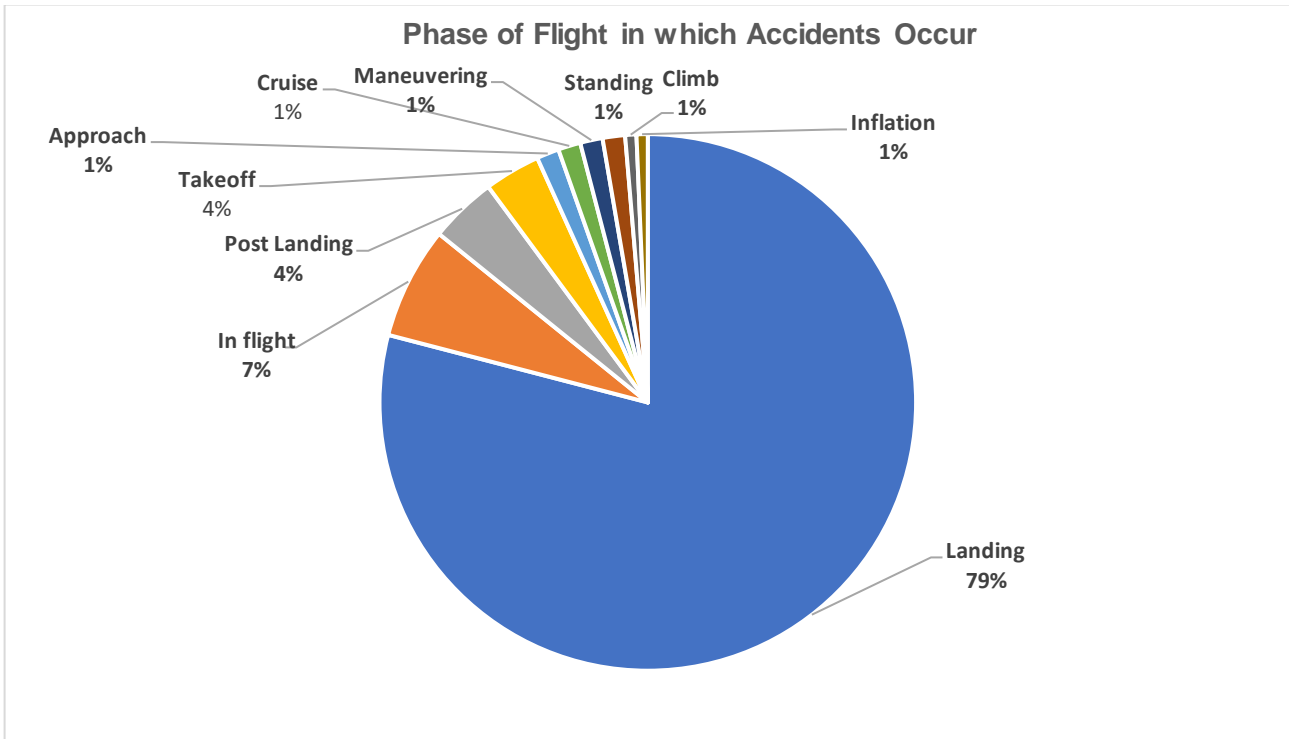
likely to be involved in a balloon accident. This myopic look, however, does not consider the ratio of accidents by each category. The vast majority of US pilots today are over 45 years of age and are commercially rated so one could reasonably expect the corresponding number of accidents to be higher amongst those groups.



*Air Race/Show totals include five (3.4%) involving commercial rides provided at balloon events.

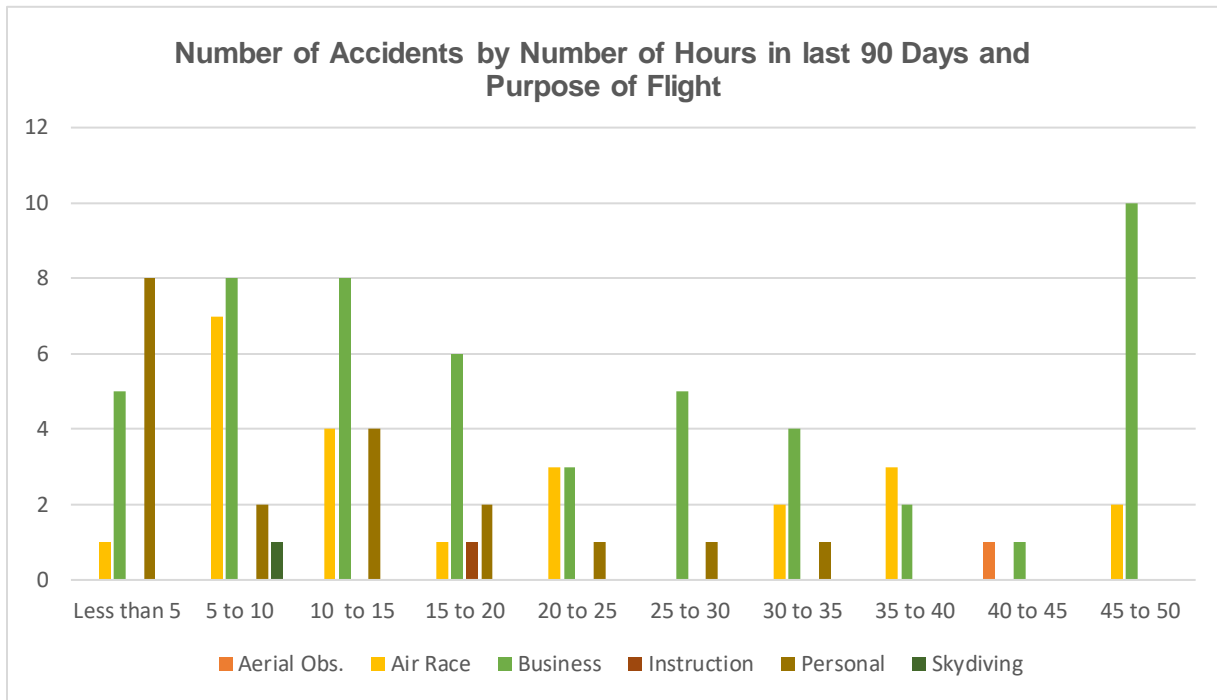
Accidents by Purpose of Flight

Over 53% (56% adjusted for commercial rides at balloon events) of ballooning accidents occurred on business related flights. In other words, flights in which compensation for the flight was involved. Air show related accidents accounted for 26% (23% adjusted for commercial rides at balloon events) of accidents for the period 2005-2017. **It is important to note that paid ride accidents that occurred at a balloon event are classified in the above graph as a balloon event occurrence.** This is the primary reason for the initiative behind this publication. It is probably fair to say flights involving compensation or events where there is either real or perceived pressure to fly account for the vast majority of ballooning accidents.



Accidents by Phase of Flight

This graph holds no surprises based on all we have learned over the years and it applies equally to fixed wing aircraft as well. Landing remains the most critical phase of flight and supports the notion that weather information must be gathered and disseminated to pilots that cover the entire flight period up to three hours.



Accidents by Hours in Last 90 Days

This graph clearly points out the importance of ‘currency’ of flight time. 14% of accidents involved pilots with less than five hours and 32% with less than ten hours PIC time in the last 90 days.

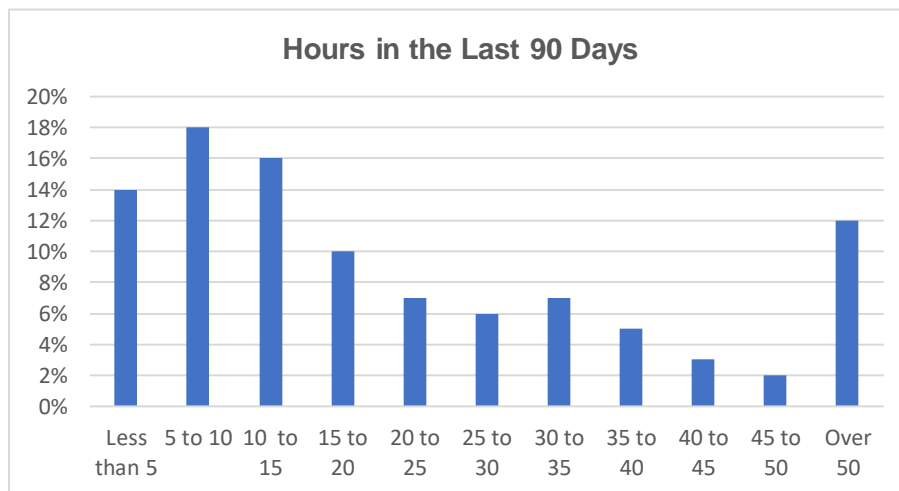
Balloon events should weigh heavily the number of hours in the past twelve months and, if evaluating lower-hour pilots, place more emphasis on hours in the ninety days prior to the event than total PIC hours.

There is a very clear trend of the majority of accidents occurring when pilots have low hours in the last 90 days.

You can see that the trend especially holds true for balloon events and business flights.

Here again, we see the anomaly of business flight accidents occurring in pilots with a large number of PIC time, large number of hours in that make and model, and large number of hours in the last 90 days. Ride pilots fly a great deal more than the general population of pilots though. So, while these numbers look large we do not have the total number of flights taken to compare them against and cannot make any statements about their risk.

The accident statistics presented above were helpful and raise questions as to the relationship between pilot hours and accident/incident frequency. The Guidelines Committee strongly encourages insurance companies serving the ballooning community to conduct an independent study of balloon accident statistics.



The insurance providers have access to significantly more details surrounding balloon accidents (based on claims history) as many accidents go unreported to the NTSB. Critical in the accident statistic investigation is the determination of the frequency, expressed as a percent of the sub-population, or propensity for accidents broken down in the five PIC categories shown above.

5.5 Accident, Incident and Violation History

As a promoter, Organizer, staff, or official for an event, the quality, proficiency and safe flying record of the pilots attending an event must be known. It is not out of line to have questions on the event's application form asking about violations of the Federal Aviation Regulations (FARS) as well as the applicant's driving records. We've experienced the horrors of the Lockhart, Texas accident and the impact that the pilot's history had on that accident. Events can't risk participating pilots having medical conditions that may impair their ability to concentrate and safely operate an aircraft. Events have begun to ask pilots to sign a statement that they have no known medical condition that would inhibit their ability to safely fly their aircraft. Here is an example of a pilot medical statement.

I certify that I am of sound mind and body and I have no medical, mental, or physical limitations or conditions that would limit or impair my ability to safely fly my aircraft. I am not taking prescription or over the counter drugs/medications that may impair my ability to safely fly my aircraft.

The sample Pilot Application included in Appendix E contains a question regarding any violations in the past five years of 14 CFR §61.15 or §61.16, Offenses involving drugs or alcohol and refusal to submit to an alcohol test or furnish test results. While the event Organizer and officials may not be qualified to determine if a pilot with such a violation is a concern is whether the offense was reported to the FAA as required by the FARs. If it has been reported, the FAA should have investigated and done its due diligence. If the notification letter was not filed, the event might want to consider this a sign of a risky pilot. Here is an example of the alcohol and drug inquiry.

If you have been convicted of any offenses involving alcohol or drugs as outlined in 14 CFR §61.15 or §61.16 while holding a pilot certificate in the last five years, have you filed the Notification Letter required by §61.15?

Any time an event receives an application from an unknown pilot, the Organizer or officials should make inquiry of experienced pilots who regularly fly in the home town of the new pilot. A general question such as "Do you know John Doe; are you familiar with his training and experience; would you recommend him to fly in an event with xx other balloons?" is an easy way to gain valuable information on new pilots to your event.

5.6 Criteria for Pilot Evaluation and Acceptance

Important evaluation and acceptance criteria needed for consideration may, to some extent, depend on the type of event being hosted: competition, paid rides, festival-sport, a combination, tether operations, glows, etc. While there are some personalities that may not fit well with all of the above, the number one criteria to consider should always be the pilot's demonstrated respect for safe flying. If the pilot has a known record of being attentive at pilot briefings, understands the importance of the sponsors and the event officials, is courteous and works well with the other balloonists, follows all the rules at refueling and is respectful and courteous to landowners, then he will probably fit well with the event. If the event is small (15-25 balloons), the size of the launch space may not be a big factor, but when balloon events are in the range of 75 to 200 and even larger, a pilot must be able to inflate and fly in heavy congestion.

The closest FSDO can provide pertinent information on the credentials of any pilot. There are many ways to streamline the on-site pilot registration process. If the FSDO elects to monitor the event, which they normally do under a Waiver, they will most likely be at the registration site to inspect the pilot's credentials, as well as log books on the aircraft. The FAA inspectors are the definitive word as to the reliability of all documents presented at the event. Therefore, it is more advantageous to have the FAA qualify the pilots and their equipment instead of one of the event staff that has no training or official jurisdiction over the documents presented by the pilots. Untrained staff may not recognize discrepancies and inconsistencies in the documents.

5.7 Pilot Mentoring Program

Event Organizers, working in concert with the Balloonmeister, might consider establishing a mentoring program to assist pilots new to their event. While this wouldn't necessarily be a formal program, matching pilots experienced in flying the local area and familiar with the unusual or unique aspects with less experienced pilots would be a great way to improve safety. Most experienced pilots are more than willing to share their knowledge and encourage less experienced event pilots.

5.8 Registered Aircraft and Auxiliary Equipment

While knowing as much information as possible about the pilot, knowledge about his/her equipment is equally important in knowing the complete safety situation. The FAA can access records for the legitimacy of repair stations and repairmen that inspect or repair the aircraft. A repair station accurately documents the hours and condition of the system as well as the age, rebuilding of the frame work and fabric, and the condition of the basket and burner system. The event staff cannot access the information provided in the same thorough manner as the local FSDO. Event staff can only record what is logged in the aircraft's log books.

While it is not within the event's ability to judge the quality of the balloonist's chase vehicle and ancillary equipment, it is reasonable to assume that the pilots attending the event will have serviceable equipment and keep them in proper working order. One of the most dangerous pieces of required equipment is the inflation fan. The Balloonmeister and Safety Officer have the authority to inspect and stop operation of equipment that is deemed unsafe. The next most important piece of equipment is the tie-off/quick release harness. There are many approved styles available and their use should be required on all inflations regardless of wind conditions.

Chapter 6

An Event Classification System - What Makes Events Different?

6.1 Chapter Overview

Determining an event's complexity is an important part of maximizing safety. Complex events require a more advanced participating pilot skill set. This chapter discusses the primary variables that combine to define an event. The defined variables are discussed as they relate to the safety of the pilots and crew. An Event Difficulty Classification Matrix is presented, incorporating the safety variables. It is designed to assist Event Organizers and Balloonmeisters in determining the complexity level of their event. Three levels (1 – Entry; 2 – Intermediate; and, 3 – Advanced), are identified and it is recommended that Event Organizers work with the Balloonmeister and Safety Officer to determine the classification level for their event. Once determined, this event classification level should be communicated to all pilots during the recruitment and invitation process.

The variables affecting the complexity level of an event generally fit within one of five broad categories that are further broken down into a total of ten event variables in the Event Classification Matrix of this chapter. The five broad categories identified are as follows:

Pilot Experience: the knowledge or skill set needed to succeed, focused less on total 'hours' and more on ability and experience with flying in events.

Environment and Topography: the physical location, its surroundings, services, weather, etc., as related to the event.

Financial and Sponsors: the monetary influence or pressure to perform.

Event Staff and Organizer Experience: the knowledge and experience levels of the Organizers and staff relates directly to the success or failure of an event as well as the safety of all involved.

The nature of the event: the stature and type of event as well as its mission and priorities.

The classification and publication of an event's complexity level can assist a pilot in determining whether they have the proper skill set, or can gain the needed skills, to feel confident of their abilities for participation in an event. It is highly recommended that the Event Organizer, Balloonmeister and Safety Officer collaborate on the safety aspect of each variable as it relates to their event and make use of the Event Classification Evaluation Matrix for proper level determination.

Event Organizers can have a positive impact on the safety level of the event by supplying the pilot an accurate and useful assessment of the flying challenges presented by the event. While the overall classification of an event is stated at one level, there might be variables or specific elements that do not fit, do not apply, or are better classified at a different level. For the safety of all concerned, it behooves the Event Organizer to pass on as much information as possible to the intended pilot audience to ensure a proper matching of pilot skills with the event's complexity.

The classification of an event is a subjective process, considering all the variables and elements comprising an event.

6.2 Event Classification Levels

Below is a broad-stroke view of the defined classification levels followed by a detailed look at many of the variables affecting the event classification process.

Entry Level (Level 1) is a good first event for the less experienced pilot who has accumulated 25-50 hours but has never flown in the congestion of an organized balloon event. The flying area for Entry Level classified events is generally not overly challenging, with plenty of landing sites. The area doesn't present large congested flying areas, wooded or swamp areas, difficult landowner areas, mountain-valley flying or higher field elevations with density altitude issues unfamiliar to the entry level pilot. Based on the reduced complexity of a Level 1 Event a minimum PIC hour recommendation would be 25 hours. It is important to note that this is a guideline and the Organizer and Balloonmeister must consider a multitude of variables when accepting pilots.

The event usually has a relatively small to moderate number of participating balloons (10-25). The pilot and Balloonmeister experience little pressure from sponsor or event Organizers to fly in marginal conditions, and sponsor rides, if required, are scheduled for one flight window only, not requiring carrying sponsor riders during competitions for competitive points or prizes. Due to the smaller size and scope of the event, consolidation of various event official jobs is possible. In addition, some of the officials may have lower experience levels. While prizes or prize money may be available at Entry Level events they are not at a level to entice pilots to fly beyond their skill level.

While we never recommend or endorse event officials flying as a participating pilot in an event, we understand that due to economics, available experienced event officials, or other variables some smaller events do allow for the Balloonmeister, Weather Officer or Safety Officer to fly in their event. This would generally only be seen at Entry Level events.

Intermediate Level (Level 2) events are for those pilots having the flight experience and proficiency to ensure their comfort and skill set required for this level. While it is difficult to assign a definitive number of PIC hours expected for all events and all circumstances, a minimum of 50-75 PIC hours is recommended. A critical element of the pilot's experience, regardless of total hours, is experience in event flying involving airspace congestion. The Intermediate Level event is more challenging to the pilot skill set on a number of levels. The flying area may include directions with challenges such as congestion and smaller or less available landing areas. Some of the airspace may be FAA controlled and possibly require the pilot to have an aircraft radio onboard. Flying may involve mountainous or valley areas creating orographic winds and balloon congestion can be heavy with as many as fifty to seventy-five balloons sharing a common launch area or navigating to a target.

Competition is possible with tasks ranging from a simple "Hare and Hound" or "Fly In" to more complex multiple tasks attracting pilots competing for points in the BFA's Hot Air Competition Division (HACD) National Eligibility System. The total prize fund could total as much as \$5,000 or more with first place awards of \$500 to \$1,000.

In lieu of competition, the event may be rich with paying passengers. The possibility of carrying as many as six to ten passengers at \$100 to \$200 each during a weekend event can create the same pressures as a rich prize purse.

Intermediate Level events are often high profile local festivals attracting large crowds and significant local business sponsorships. Even if not expressed by the Event Organizer or Balloonmeister, there is some perceived pressure to fly to satisfy the sponsors and public. Most likely, one or more passengers are required to be flown for the benefit of the event. These are usually event sponsors or VIPs.

This level of event should have a full complement of independent officials including Balloonmeister, Safety Officer and Weather Officer. Pilots should expect these officials to remain on the ground to be available for continuous monitoring of the event, weather and pilot flights. Officials flying in Intermediate Level events is not recommended.

Advanced Level (Level 3) events are challenging and require a higher level of event flying experience as well as a comfort level and skill set matched to the demands of the event. In addition to all the topics discussed in the Intermediate Level, there may be additional complexities relating to the flying area, along with possible high altitude launch sites. Surrounding airspace may contain FAA restrictions or other challenges such as a large number of prohibited zones (PZs), or other sensitive landowner issues. Strong map reading and monitoring skills may be required. ATC communications may be necessary, and pilots should be comfortable with required communications.

Based on the increased complexity of a Level 3 event the minimum PIC hour recommendation is 100 hours. It is important to note that this is a guideline and the Organizer and Balloonmeister must consider a multitude of variables when accepting pilots. A pilot's quality of flying experience is far more important than the mere accumulation of hours logged.

Level 3 events often involve State, Regional or National Championships. Competition is likely to involve more complex multiple tasks. Participating pilots may be competing for points in the BFA's Hot Air Competition Division (HACD) National Eligibility System and prize funds could range from \$10,000 to \$50,000.

Carrying paying passengers in high profile events can challenge pilots with highly congested, wooded or mountainous areas.

Most likely the pressure from Organizers and sponsors to fly and perform is high. Competition could be highly competitive (e.g., US Nationals or other Championships), where more is at stake – high value prizes and or National points. This could also be an event with a large number of balloons (75+) with sponsor flight requirements and/or pressure to fly passengers. This event usually has a full complement of experienced officials who remain on the ground to monitor all aspects of flight operations and safety.

6.3 Specific Event Variables and How They Influence the Required Pilot Skill Set

Participating Pilot Experience Level – An FAA license, like a car license, does not ensure the specific skills required for every environment. A pilot's experience level is a combination of factors. The number of PIC hours by itself is, however, not the only measure of experience. One must also take into account the type of flying including: event congestion and pressures; airspace and terrain; and difficulty of landing areas.

A pilot having flown only once in the last six months may not be as sharp, skill wise, as one with a number of flights in the last month. An experienced pilot with reasonable hours in the past twelve months, who attends several events with varying weather and terrain conditions, most likely possesses a stronger event skill set than a home-based pilot with little experience flying in unfamiliar areas. The skill set required increases with the difficulty level for this variable.

'Lemming' effect – It is human nature to follow the leader. Well respected event officials and staff should express informed, independent opinions on flight conditions. This complete and candid reporting is a prerequisite for pilots in recognizing and evaluating the risks of flight as it relates to their personal level of risk tolerance. In addition, pilots need to make flight decisions based on their personal level of experience and skill as they relate to existing and expected flight conditions rather than making their decisions influenced by the actions of others. Failure to do so may put a pilot in the position of flying beyond their capabilities which can lead to an unsafe outcome.

Airspace Restrictions – Restricted airspace can add a level of complexity to the flying experience. Proximity to D, C, or B airspace can restrict altitude and direction as well as require tower communication. Military bases or Military Operations Areas may have restricted or no-fly areas. Some areas may experience Temporary Flight Restrictions (TFRs) when high-level government officials are visiting nearby. The event itself may have a Waiver to alter specific FAA rules such as minimum altitudes, etc.

Event Environment – US hot air balloon events are hosted in a wide variety of geographic areas. With the possibilities of mountains, valleys, prairies and high elevations, large bodies of water as well as urban and metropolitan areas, each venue is comprised of its own unique physical and topographical features. These environmental features can greatly influence the type of flying encountered. The location of an event has an impact on the skill set required for the safety of pilots, passengers and landowners. Other than weather, a pilot is concerned with the ability to fly safely to a suitable landing area within their fuel limits. Adding to those concerns are physical obstacles including power lines, buildings, and PZs, especially as the pilot approaches the landing phase of the flight.

An urban flying area may have smaller or fewer landing areas. Whether a flying area is open in all directions or has limitations in various directions due to hazards, congestion, etc. may require a certain level of skill to navigate and land safely.

High altitude flying differs from sea level flying in the responsiveness of the balloon system (remember *density altitude*). For a more thorough discussion of density altitude see *Balloon Flying Handbook*, page 3-8. Mountain and valley flying differ from flat or slightly rolling terrain. These differences can include wind shifts as the flight progresses and wind currents that can increase the complexity of contour flying.

Government restricted, as well as industrial areas, can reduce the available landing areas. Prohibited zones and sensitive landowner issues can affect not only landing and fuel supply considerations, but also how low a pilot can make an approach for landing.

Forested and swamp areas can be foreboding to a number of pilots due to limited landing areas. The proximity to large bodies of water can affect the wind currents and flight track. An additional concern is whether the pilot has enough fuel to overfly forests, swamps, or water bodies to reach a suitable landing spot.

Once in flight, a pilot cannot escape landing. In advance of an event, Organizers should work with schools, parks, businesses, farmers, etc. to educate them on balloon operations and the need for open launch and landing areas. This can not only help in opening up landing areas but also aids in discovering those areas that are sensitive to balloon flight. A balloon event should ensure that pilots are aware of the type of landing areas, PZs, and other restricted or sensitive areas. Event Organizers should work with experienced Balloonmeisters to evaluate the flying area. Once these individuals have a good feel for the area, they should communicate with the pilots they intend to invite a general description of the type of flying area they will experience. For example, an event in an area with an MSL altitude of 5000 feet might want to advise, *“Flying in this event involves high altitudes. Participating pilots should have experience with this type of flying and its effects on fuel consumption, available lift, and balloon performance.”* Another example might be, *“Flying in this event involves some congested areas with smaller landing areas. Participating pilots should be comfortable with this type of flying.”*

For this variable a pilot experienced only in large plentiful landing areas may find it difficult adjusting to small or very limited landing areas found in the intermediate or advanced difficulty level.

Weather Conditions Unique to the Event – All events deal with varying weather conditions. There are, however, some events whose unique topography can create or influence weather and wind conditions not familiar to pilots from other flying areas. These unique conditions should be thoroughly discussed with the pilots at the general briefing. Local pilots should assist new visiting pilots in understanding these unique influences on winds and weather.

Geography can influence the winds. Mountainous areas can experience orographic wind flow, cloud formations and can distort the normal flow of the wind by compressing/increasing its speed on one side and the creation of rotors or other turbulence on the opposite side. Valley flying can have brisk morning drainage winds and morning winds flowing one direction, whereas afternoon winds generally flow in the opposite direction. Additionally, areas near the large bodies of water could have a strong ‘sea breeze’ at flight time.

Micrometeorological awareness for an area and having the skill set to handle it can make for a safer flying experience. These more challenging weather conditions are associated with this variable’s intermediate or advanced difficulty level.

Real or Perceived External Pressures to Fly – All aspects of the flight decision-making process and any go/no-go decisions rest solely on the pilot in command (PIC). External forces that complicate or influence the decision to fly can come directly or indirectly from many sources: sponsors, Organizers, media presence, crew, paying passengers and fellow pilots. Sponsors are the financial backbone of events and the requirement to fly sponsors or put on a show might have pilots feeling they have to perform when they might otherwise remain on the ground. A high-profile event (25th event anniversary, US National’s, etc.) with lots of media coverage, a large paid audience, etc. can have pilots feeling pressure to fly, often in conditions beyond their experience or skill set.

An event Organizer has the added pressure to put on a successful event and entertain the assembled crowd. They may feel compelled to push for or encourage a flight due to previously lost flight windows, backed up passengers, etc. This pressure can also trickle down to the Balloonmeister and Safety Officer.

Pilots that can handle this type of pressure, whether real or perceived, responsibly are an asset for a safe flying environment.

Pilots' Self-Imposed Pressure to Fly – Feeling the need to fly, for whatever reason, could lead pilots to fly in conditions beyond their abilities.

Examples of self-imposed pressure:

- Trying to make the trip worthwhile – “I drove this far, and I have crew or locals I want to fly.”
- May affect competitive position – “If I miss a flight window it will affect my position in the overall standings.”
- Paying passengers – “There’s a lot of money to be made; I can’t pass it up.”
- Event Organizer dangles additional incentives (more prize money, bonus money, non-monetary perks) – “I can’t pass it up.”
- Perceived denial of future participation in the event – “If I don’t fly when others do, I risk not getting invited back.”

Experience of Organizer and Balloon Operations Staff – The likelihood for a safe event increases with experienced event Organizers and officiating staff. There is so much to learn and much of the learning comes from experiencing a wide range of event dynamics.

An experienced Balloonmeister with a good reputation will make an informed go/no-go decision in consultation with his Weather Officer, Safety Officer and others. An experienced and independent Safety Officer is adept at using their weather analysis skills along with an ability to recognize and address safety issues in a professional manner. The seasoned Safety Officer is skilled at assessing the field’s skill set.

In larger or more challenging events, both the Balloonmeister and Safety Officer remain on the ground to monitor and control all aspects of the balloon operations, including crowd control and refueling. By not flying, event officials become more accessible and can focus all their attention to event flight operations and safety.

An experienced Weather Officer has the ability to deliver a comprehensive weather briefing that assists pilots and the Balloonmeister in making crucial decisions required for go/no-go decisions and a safer flight. The experienced Weather Officer knows how to handle, and remove himself from, external Organizers, sponsors or other influences that could run counter to overall event safety.

Quality of Launch Field, Crowd Control and Community Safety Services – Appropriate size launch fields along with community safety services to handle emergency situations as they arise, are needed for a safe event. Most events also recommend and implement crowd control mechanisms. Controlled access and well-defined areas for refueling, along with the visibility and availability of Fire/EMS/Security services are signs of a well-organized and safety-conscious event.

Ideally, a launch field is large enough (1½ - 2 acres per 10 balloons) to safely handle the number of balloons and their tie-off vehicles. Entry level events most likely require slightly lesser space due to the fact there are fewer balloons, friendly, if any, competition and an overall less challenging environment with most pilots not pressing to launch quickly or in a very short window. In any case, adequate launch space is required for mass launches.

Space requirements increase for each progressive level. Highly competitive events require more space per balloon because many competitors may want to launch at the same time and chase crews leave the field together. Events known for launching in more wind require enough space to handle balloons rolling from side to side on the ground.

A secured fence line around the mass launch field, with only authorized personnel allowed to enter, enables pilot and crew to concentrate on balloon operations rather than having the unknowing spectator impact safety. To raise the level of interest in ballooning and/or the festival, there are times when it might be appropriate to open the field to spectators for an up close and personal view. One example might include when flights are cancelled due to low ceilings or fog, but surface wind is calm. Once the balloons have inflated, allowing the public on the field can be a real crowd-pleaser. After balloons have inflated

for a night glow also produces a possible window to open the field. Using the public-address system, the field should be cleared of all spectators before the balloons begin the deflation phase.

Some events have operated safely while allowing spectators on the launch field during non-competitive flights. This can be safely done, but it adds an element of risk. Any time the launch field is open to the public, close monitoring by experienced launch directors or marshals is a necessity. Regardless of the launch field/spectator situation, it is extremely important to have Fire, EMS, and safety forces on-site and available for handling any safety issues that may arise.

Weather Officer Expertise, Quality and Completeness of Reporting – What will happen during the flight window is extremely important to ballooning. We continue to stress the importance of quality weather data and completeness of reporting. Knowledge of weather occurring in the launch/flying area (micrometeorology), its idiosyncrasies, what to expect during the flight window, etc., all play a major role in a pilot's decision-making process.

More accurate and timely weather data, combined with the skill of a reputable weather officer, can lead to better informed decision-making on the part of the event staff and pilots. Poor or incomplete weather data can mislead pilots, possibly leading to a more challenging flight or unsafe flying decisions. Additionally, a pilot's trust and confidence in the reported weather forecast can erode over time due to lack of usefulness – to the point of a viable forecast not receiving the deserved attention.

For this variable, the quality and timeliness of the weather data and the professional background of the weather officer increases with each event difficulty level.

6.4 The Event Classification Process

The following decision 'matrix' was designed to assist event Organizers and officials in the classification of the real and perceived difficulty of an event. Collaboration between the Organizer, Balloonmeister and the Safety Officer will lead to a knowledgeable decision. The purpose of classifying an event's difficulty is to provide potential attending pilots a background to help them make independent decisions based on matching their particular skill set with the demands of the event.

The overall rating provides pilots with judgmental information to assist in a determination of whether their skill set matches that needed for any given event. A pilot can also determine which skills they may need to develop before attending a Level 2 or Level 3 event.

Various aspects of an event may span all three difficulty levels depending on the identified variable. The purpose of the matrix is to provide a tool, understanding that there is no perfect system. This is an exercise that asks event Organizers to consider the identified variables that influence the difficulty of their event and make efforts to inform invited pilots of the challenges they may face.

Event Classification Evaluation Matrix

The matrix presented on the following pages is designed to assist Event Organizers and Balloonmeisters in classifying their balloon event into one of three complexity levels. There are numerous gray areas and some events may contain elements of all three classification levels. And, that's ok. In the final analysis, the Organizer and event officials should determine which classification most closely represents their event considering all the variables taken as a whole. Just because an event has one or two variables in the Advanced Level doesn't mean it may not be considered an Entry Level event.

Event Classification Evaluation Matrix

Event Variables	Level 1 Entry level	Level 2 Intermediate	Level 3 Advanced
Participating Pilot Experience Levels	<ul style="list-style-type: none"> • 25-50 PIC hours is acceptable • Event features large landing areas with few congested areas or restrictions • Event accepts pilots with no or limited event flying experience • Recent flight experience should include multiple flights commensurate with event's difficulty level. 	<ul style="list-style-type: none"> • Generally looking for pilots with a minimum of 50-75 PIC hours with many events requiring 75+ hours. Pilots must demonstrate experience and proficiency in event (congested airspace) flying • Some congestion and occasional tight landing areas • Map skills are needed due to PZs or sensitive landowner issues • Participating pilots should have some experience with event flying as well as flying outside their home area • Experience in navigating with obstacles including towers, power transmission lines and airspace restrictions • Recent flight experience should include multiple flights commensurate with event difficulty level. 	<ul style="list-style-type: none"> • Looking for pilots with demonstrated event experience and proficiency in flying in a congested field. A minimum of 100 PIC hours with preference to higher-hour pilots is recommended • Comfortable with congested flying and tight landing areas • Experienced with terrain, cold or hot weather as well as altitude flying required by event geography • Pilots possess a high skill set • Able to navigate and handle potential for complex flying conditions: multi task competition, challenging weather, high altitude operations and difficult terrain features • Recent flight experience should include multiple flights commensurate with event difficulty level.
'Lemming' Effect	<ul style="list-style-type: none"> • Inexperienced staff that could have difficulty understanding the concept of directing to the lesser experienced pilots • Participating pilots may not knowledgeable of experience level of other pilots 	<ul style="list-style-type: none"> • Reasonably experienced staff with separation of duties • Officials remain on the ground and continually monitor changing flight conditions • Pilots are somewhat familiar with other participants experience and can consider that in making their decision 	<ul style="list-style-type: none"> • Well-seasoned staff with expertise in their assigned area • Staff respects each other but understands the need for independence • Pilot field is experienced and have demonstrated sound decision-making in the past relative to their assessment of the go/no-go decision
Airspace Restrictions	<ul style="list-style-type: none"> • Event flying area is primarily unrestricted airspace • FAA Waiver may or may not be utilized • No close proximity to Class D, C or B airspace • Aircraft radio not required 	<ul style="list-style-type: none"> • Flying area contains congested areas requiring altitude restrictions • Event in close proximity to or perhaps has operations inside of Class D, or C airspace • FAA Waiver in force and FAA monitors on site for document exam and may assign the monitoring responsibility to the Waiver holder • Aircraft radio sometimes required. 	<ul style="list-style-type: none"> • Flying area includes Class D or C airspace requiring tower coordination with event officials • Significant congested areas within the flying area • Numerous PZs containing altitude restrictions • FAA Waiver in force and one or more FAA monitors present for all flight operations

Event Classification Evaluation Matrix *continued*

Event Variables	Level 1 Entry level	Level 2 Intermediate	Level 3 Advanced
Event Environment	<ul style="list-style-type: none"> • Event generally involves rural flying areas • Good launch and landing areas in all directions of the compass • Few obstacles with flat or gentle rolling terrain. • Landing areas are prevalent and suitable for a novice pilot • Smaller field of pilots – 10 to 25 • Few landowner issues and little or no PZs 	<ul style="list-style-type: none"> • A combination of rural and urban flying areas • Flying area may contain difficult flying areas in one or more directions • Several congested areas requiring comfort level in dealing with tight landing conditions • Flying area contains areas involving difficult landowners with livestock or crop issues, exotic animals, large zoos • Orographic winds or hill and valley flying may involve strong drainage winds and need to go to altitude to navigate • Large bodies of water, swamps or forests pose challenges in some flying directions • Moderate to larger field of pilots participating – 25 to 75 	<ul style="list-style-type: none"> • Significant areas of congested flying • Limited areas for pilot selected launch or landing areas due to landowner issues (Indian reservations, military base or government lands), red or yellow PZs, or geographic and terrain issues (lakes, rivers) • Pilots and crew need to control large crowds attracted to landing areas • Mountain and valley flying (orographic winds and cloud formations) may involve strong drainage winds and need to go to altitude to navigate • Event requires launching from densely populated downtown areas for promotional purposes • Some or all of the following conditions are present in the flying area: cold or hot temperatures, high altitude launch field or high-density altitude, sea breezes, expected high winds at take-off or landing, susceptibility to becalming situations • Large event with 75+ pilots
Weather Conditions Unique to Event	<ul style="list-style-type: none"> • Stable and predictable weather patterns • Event is held in moderate temperature seasons and geography 	<ul style="list-style-type: none"> • Area has a propensity for thermal development • Morning drainage winds can create high wind inflations • Terrain and geography can cause winds to come up more quickly than expected 	<ul style="list-style-type: none"> • Propensity of T-storms to crop up unexpectedly. • Weather usually changes quickly during flight window • Terrain and geography can create challenging launch and landing weather conditions
Real or Perceived External Pressure to Fly	<ul style="list-style-type: none"> • Organizer and sponsors have nothing to do with the Balloonmeister's decision-making process. • Small event with a 'loose' organization but there are no Organizer or sponsor expectations to fly 	<ul style="list-style-type: none"> • Pilots are expected to perform in 'pilot discretion' situations or static displays • Organizer(s) and sponsor(s) attempt to influence Balloonmeister's and pilot decisions. 	<ul style="list-style-type: none"> • Organizer(s) and/or sponsor(s) have a direct influence on the Balloonmeister's decisions. • Pilots are expected and enticed, via added incentives, to perform in 'pilot discretion' situations or marginal conditions • Event officials fly in marginal conditions enticing the 'pack' to fly (lemmings)

Event Classification Evaluation Matrix *continued*

Event Variables	Level 1 Entry level	Level 2 Intermediate	Level 3 Advanced
Pilot's Self-Imposed Pressure to Fly	<ul style="list-style-type: none"> • Event has no financial incentives based on pilots' decision to fly • Competition is low key and prize fund, if any, is not unduly skewed to only the top performers • Event prizes are distributed based on random drawing and not based on flights flown by the pilots • Little or no media coverage 	<ul style="list-style-type: none"> • Paid passenger rides are available for participating pilots and they are assigned in an equitable manner with reasonable limitations on the number allowed to be carried on any given flight • Competitive events with ability to earn points toward the BFA/HACD National Eligibility System • Prize fund of a few thousand dollars (\$3,000 - \$5,000) • Media presence influencing commercial operator decisions 	<ul style="list-style-type: none"> • An over-abundance of paid passenger rides exists • Pilots travel long distances for the sole purpose of carrying a large number of paid rides • Highly competitive event including some or many of the following: counts towards National Eligibility, large prize fund (\$10,000 - \$50,000), complex multiple-task flights, large number of competitors, prizes based on cumulative flight results as opposed to individual flights • Large media presence for commercial operators
Organizer and Balloon Operations Staff Experience	<ul style="list-style-type: none"> • An event in its first three years of existence • Simple organization led by two or three key individuals • Smaller events are excellent venues for aspiring event officials but should be run under the guidance and counsel of an experienced Balloonmeister • Safety Officer and Weather Official work in concert with Balloonmeister • Event officials may also fly in smaller events 	<ul style="list-style-type: none"> • Requires a relatively experienced local group of volunteers or Chamber led by a strong Organizer • Balloonmeister has a demonstrated ability to make sound decisions and work in concert with trusted Safety Officer and Weather officer • Safety Officer well versed in his responsibilities and voices independent opinion • Weather Officer an experienced pilot well versed in weather gathering techniques and familiar with this event's flying area or a professional meteorologist • Balloon officials do not fly in the event remaining on the ground and available to make continuing analysis of the flight operations and work with any assigned FAA personnel 	<ul style="list-style-type: none"> • Led by a strong local organization (Chamber, not-for-profit LLC, etc.) • Organizer is responsible for all non-flight aspects of the event and remains independent from balloon operations • Requires a well-seasoned and respected Balloonmeister thoroughly familiar with flying conditions for this event as well as the participating pilots range of experience • Safety Officer is experienced in this role, well versed in his responsibilities, and voices independent opinion • Weather Officer should be a professional meteorologist or at least supported by professionals at NWS • Event operates with a well-defined organization chart demonstrating separation of duties designed to maximize safety • Balloon officials do not fly in the event remaining on the ground available to continually monitor flight operations and work with any assigned FAA personnel

Event Classification Evaluation Matrix *continued*

Event Variables	Level 1 Entry level	Level 2 Intermediate	Level 3 Advanced
<p>Quality of Launch Field, Crowd Control and Safety Services</p>	<ul style="list-style-type: none"> • Launch field for smaller events may be smaller parks or other public areas • Requires about 1 ½ acres of unobstructed space for every ten participating balloons • Crowd control at launch field may be informal lines controlled by volunteers or public-address system • Safety services on site or on-call should the need arise • Propane refueling is often at the provider's site but still requires control and safety guidelines enforced 	<ul style="list-style-type: none"> • Requires larger launch fields with the ability to segregate from crowds • Requires 1 ¾ to 2 acres of unobstructed space for every ten participating balloons • Crowd controlled with fences or well defined natural boundaries monitored by event staff • EMS and safety forces on site • Propane area well defined and controlled. Safety guidelines established for refueling and enforced • Fire services on duty at propane refueling 	<ul style="list-style-type: none"> • Large events require larger areas with well-defined borders with limited access for approved flight personnel only • Should provide 2 acres of unobstructed space for every ten participating balloons • EMS and safety forces on site with a high-profile presence noted • Propane area well defined and controlled. Safety guidelines established for refueling and enforced • Fire services on duty at propane refueling
<p>Weather Officer Expertise, Quality and Completeness of Reporting</p>	<ul style="list-style-type: none"> • Little history for newer events • Weather presentations are often Informal and presented verbally with no written briefing sheet or radar presentations • Weather information reported in a fair and impartial way but without the sophisticated analysis provided by experienced or professional weather officials 	<ul style="list-style-type: none"> • Weather information gathering and reporting is well respected by pilots as complete and unbiased • Well-structured pilot briefings following recommended protocol • Balloonmeister enforces pilot attendance and attention during all briefings. Pilots are not permitted to 'hang out' outside of the briefing tent or room 	<ul style="list-style-type: none"> • Weather analysis provided by an experienced professional meteorologist familiar with hot air balloon operations and micrometeorology • Weather information gathering and reporting is well respected by pilots as complete and unbiased • Event has real-time wind (theodolite) and radar analysis available for pilot briefings • Well-structured pilot briefings following recommended protocol • Balloonmeister enforces pilot attendance and attention during all briefings. Pilots are not permitted to 'hang out' outside of the briefing tent or room

Chapter 7

Decision-Making Synergy



Organizers, Officials and Pilots

7.1 Chapter Overview

Understanding the interrelationship of decisions made by event Organizers, officials and pilots is critical to ensuring an event run with the highest level of safety standards. The error-chain is real and seemingly simple decisions on any given facet of the balloon event can have grave results, given the interaction of various decisions. In other words, no decision can be evaluated in a vacuum. It's very important that the Event Organizer, Balloonmeister and Officials are all on the same page and support open lines of communication.

7.2 Organizer Decisions

In order to have success in organizing and running a balloon event, it is important to establish an event mission and goals as well as the organizational structure to support those goals. If this is a first-time event, consulting with other successful events and their Organizers will assist in developing the necessary plans and structure, but they must be realistic for the size and scope of the event. If it is an established event and improvement is needed, careful examination of past problem areas should be addressed and corrected. The first and most important item which should be addressed, and to make sure their event complies with the stated goals, is to engage the most experienced and qualified team of officials available. They should be provided the tools needed to perform their duties to the best of their abilities. While there are many aspects of an event that do not necessarily (or directly) involve balloon activity, involving the Balloonmeister in all stages and phases of planning will ensure that an integrated event will be produced. For example, the Balloonmeister may have knowledge of aspects of planning that may affect the Waiver and balloon operations of which others are unaware.

Here are some examples of pre-planning that can go a long way toward avoiding error-chain events that can disrupt a safe event.

Engage the Best Team of Officials Available

The earliest stages of planning should involve the selection of the Balloonmeister and his staff. Don't just look for the most convenient and expeditious choice; it is highly recommended that the Organizer recruit and engage the best technical personnel and empower the Balloonmeister and his staff to make the critical decisions they must in an independent fashion based on the information at hand.

Proper Facilities Enhance Pilot Safety

There is nothing worse for pilots, crew and officials than to meet in a noisy meeting room or outdoor tent when critical flight and weather information is being explained. Not only is it discourteous, but excessive crowd noise during a Flight Briefing can be distracting and dangerous. Adequate facilities for the officials to meet and plan the flight is critical. Adequate space for pilots and crew to sit and listen to the Flight Briefing is recommended. Essential to the briefing process is adequate space for a controlled briefing. The best option is a building or hangar (if at an airport) adjacent to the launch field. If that is not an option, proper sized tents, chairs, power for lighting and Internet are recommended. These facilities should be large enough to accommodate the pilots, crew chiefs and extra crew, sponsors, 'designated flightcrew', officials, and FAA personnel. Due to the early morning schedule, the event needs to provide or have the availability of coffee, juice, and some type of nourishment.

Pilots should be provided housing within a reasonable distance of the briefing center and primary launch field. Sleep is at a premium during balloon events and an extra half hour of travel time in the morning and evening adds to pilot and crew fatigue. In order to expedite pilots' launch field ingress and egress, separate 'pilot only' entrances should be provided.

Sponsor Relations and Fundraising

Sponsors are the lifeblood of an event. They must be informed of the weather sensitive nature of balloon events. Ensure that their expectations of potential media exposure, sponsor rides, etc. are realistic and spelled out in pre-event correspondence and contracts. It should be clearly stated in all solicitations, advertising, and promotions that balloon activity is **"weather permitting."** It's imperative to have the event fully funded and all expenses paid for before the gates open.

Many events rely on paid gate admission to assist in funding their event. Admission prices can vary from \$5 to \$20 depending on the venue and additional entertainment offered. However, be prepared to offer refunds for weather cancellations rather than applying pressure to pilots to fly. A better approach might be to sell entry/parking packages for the duration of the event allowing multiple entries for a fixed price. A charge for parking rather than field admission might soften the effect on disgruntled spectators if balloon events need to be cancelled due to poor weather.

Paid Passenger Events

Paid passenger events add another dimension to the go/no-go flight decision of the Balloonmeister due to the exposure of risk to the Organizer, event officials, and the pilot. If the event lets the pilots solicit rides on their own, the event has no control over an over-zealous pilot who exceeds the passenger and weight limitations of the aircraft and does not require the passengers to sign the appropriate liability releases for the protection of the event and pilot.

A ride booth with a 'balloon knowledgeable staff' and complete understanding of balloon ride operations is the best defense in avoiding misunderstandings, irate passengers, and possible litigation from accidents. Being able to properly allocate passengers and deal with passenger disabilities can save a lot of aggravation in the process. The proper management of event paid rides by the Organizer and event officials should take the following into consideration:

- Only pilots with a commercial certificate may carry passengers for hire
- Paid riders come in all shapes, sizes and ages. Wind speed tolerances should be adjusted to reflect the risks to inexperienced flyers.
- Evaluate level of commercial pilot experience.
- The legal system places the highest level of care and responsibility on pilots, Organizers and event officials when passengers are carried for hire.
- Use of a written passenger briefing informing passengers of the inherent risks and what is expected of the passenger is mandatory.
- FAA Waivered events require all passengers to sign a designated Flightcrew person acknowledgement stating they have attended the pilot and crewmember briefing and have read the FAA Waiver and been briefed on its limitations
- Passenger screening process – evaluate passenger size, physical condition, sobriety, etc.

One area of particular concern can be when persons with disabilities want to fly and their disability may present a severe hazard to the safety of the other passengers on board as well as the aircraft itself.

Legal issues abound when events choose to offer paid rides to entice pilots to attend their events. As an example, one court case involved a person requiring the use of a wheel chair booked a ride by phone. The pilot, acting as the Organizer and booking agent, suggested that the passenger should not attempt to ride in a hot air balloon and refused to book the ride. He was then sued under the Americans with Disabilities Act and lost his case in court. Had he booked the passenger, and then, as the pilot in command and under the authority granted him by the FAA, cited his refusal to carry the passenger based on the fact that it would create a hazard to other passengers and the aircraft, perhaps he would have prevailed in court. It is very important to have all the appropriate releases signed as well as a printed, signed acknowledgement that the passenger understands the inherent risks and is willing and capable of performing any assigned task as a crewmember. It is also important to give the passengers a full briefing in the presence of crew or other persons. Chapter 8.7 includes the details of this FAA regulation as it pertains to "waivered" events.

Auxiliary balloon activities are not as simple as they may seem. These activities can present risks to the event as well as the participants and add to the complexity and dynamics of the event. They need careful analysis of weather conditions and potential weather conditions that may develop in the course of their activity. They require the attention of event officials in order to be planned and executed in a safe and organized manner. These activities include night glows, tether operations, dawn patrols, walk-in balloons, “show and tell” and “fluff and puff” demonstrations.

Tethers can be as dangerous as any flight and should be performed by a knowledgeable and tether-experienced pilot. A proper three or four-point tether or a top and bottom tether is recommended for all tethers. Proper tie-offs and tie-off points or vehicles should be approved by the Safety Officer, and all of these standards need to be written in the Operations Manual. Refer to the *Balloon Flying handbook*, 7-13, 14 and the *Hot Air Balloon Crewing Essentials* 129-131.

Dawn Patrols are flights that originate pre-dawn and fly into and beyond sunrise. The participating pilots and event officials need to be very cautious about the formation of fog or changing weather conditions around sunrise and require that the pilot have the proper lighting systems and logbook endorsements for this type of flight. Check in the *FAR and AIM manual* 14CFR §61.57 and 14CFR §91.209 for regulations on this type of flight.

Walk-In balloons utilize envelopes that are no longer airworthy. They are older, retired balloon envelopes that have been relegated to a visual attraction on the field. Children and adults are allowed to go inside the inflated balloon and play, have photos taken, etc. for the entertainment value. In most states, these balloons fall under the jurisdiction of the Department of Agriculture or the state entity that governs fairs, carnivals and amusements. They can be included on the pilot's insurance program on request (and should be). The number one danger with these older balloons is the device used to keep them inflated. If they use a gasoline inflator fan, such as used in regular balloon operations, they should be monitored constantly, and the exhaust should be directed away from the interior of the balloon. Using fan blowers attached to tubes in specially designed walk-in balloons is a safer method but also require a generator or power source to run the fans. Other considerations that may come into the scrutiny of the agency overseeing the device will be fireproof material and emergency exits in the balloon.

Night Glows have become very popular in the last decade. They are a photographer's highlight of a balloon event. Generally at dusk, the balloons are inflated and, using the liquid burner, they light up like giant luminaries in the night. They also present a challenge for the pilots and crew as they are working in darkness surrounded by ropes, tie-offs and vehicles in close proximity to the balloon. Many times the pilot is somewhat blinded by the lower yellow glowing flame and runs the risk of burning holes in the lower end of the aircraft. Pack up in the dark is always difficult unless perimeter lighting is provided.

Pilots are required to equip their balloon with aircraft lights under 14CFR §91.209, if planning night tether operations. Aircraft lights are not required for ground-based static displays after sunset.

Fluff and Puffs are a term we use to demonstrate and educate the attending public WHY we don't fly in certain wind conditions. While it is generally accepted that a demonstration of this type will not result in a full inflation or launch, it does give the public a show that helps them understand the battle of Mother Nature versus the balloon and pilot. Only the most experienced pilot that is willing to do this demonstration should be allowed to attempt this display. All of the necessary safety equipment, tie-offs and experienced crew assistance should be utilized.

Show and Tell is probably the most benign demonstration as far as safety is concerned. In most cases of this demonstration, weather has prevented any balloon activity. The pilots put their equipment out at ground level and invite the general public to view the basket and burner and ask questions. This is quite useful in educating the public and creating interest in the future of the sport.

Potential Organizer Pitfalls and Perceived Issues

Pilots participating at balloon events sometimes have the perception that Organizers and sponsors are applying pressure to the event officials and pilots to 'put on a show.' All need to recognize that the pilots are viewed as the entertainers at a balloon event. However, this form of entertainment comes with a price in order to ensure the safety of all concerned. Pilots must understand that they do have an obligation to 'perform' once they apply for and accept admission to a balloon event. However, it is important to note that 'perform' does not mean fly in poor weather conditions or engage in any balloon related activity that would jeopardize the safety of pilots, crew, general public or balloons and related equipment. Organizers need to understand that ballooning is a fair-weather sport and safety risks increase exponentially when good weather turns marginal. So, what's the solution? Here are some common-sense tips for Organizers to consider.

- No matter how strong the temptation, the Organizers should stay out of the official operations room. When the officials have reached a flight decision the Balloonmeister will advise the Organizer and provide a complete discussion relating to current conditions and the decisions made.
- Never fall prey to the '**pilot discretion**' flight where the Officials try to remove themselves from making the initial "go-no go" decision. If the weather conditions are not suitable to launch the entire field, the flight should be cancelled for all participating pilots. These "pilot discretion" flights can lead to the "lemming effect" with some pilots flying beyond their capabilities and experience level as other more experienced pilots launch. These situations can also lead to disgruntled sponsors not understanding why some pilots flew but not their assigned pilot.
- If weather causes a flight cancellation, consider other suitable on-field demonstrations that the officials feel are safe and appropriate given the circumstances. For example, a morning flight cancelled due to poor visibility and low ceilings could easily allow a static on-field display allowing the crowd to mingle with the balloons and meet and greet with the pilots and crew.
- There is no such thing as a 'short hop' in ballooning. Organizers often encourage a short flight to get a show before incoming weather. There is no assurance that a balloon pilot will find appropriate landing spaces in the time required before incoming weather. Invariably, a pilot or group of pilots will miss quick landing areas and find themselves in winds or other weather creating unsafe landing conditions. The pilots' need to land mentality can cause knee-jerk decisions and attempts to land in inappropriate sites. Some accounts attribute the pilot's overriding need to land at the first available field to one of the error-chain causes of a terrible Virginia accident in May 2014.
- Winds should be reported at levels up to at least 1000' AGL. Reporting of only surface winds raises suspicion that Organizers are influencing weather officials to limit their wind reporting.
- Weather reports should be presented only by the Weather Officer, comments about the weather by Organizers or anyone else is inappropriate. Never permit anyone to provide an overly optimistic spin on current or anticipated weather conditions.

7.3 Balloonmeister Decisions

A Well Thought Out Event Timetable Helps Reduce Pressure

This seemingly simple and straight forward task can be a contributory factor to an error-chain. The event's weekend timetable should be built around official sunrise and sunset. It is important to allocate a reasonable amount of time to explain the flight plan, competition tasks, process passengers, inflate and launch the field of balloons.

Depending on the nature of the event, morning briefings should be scheduled 15 to 45 minutes before sunrise with all planned flight activities **complete** no later than two hours after sunrise. This timeframe should be shortened or lengthened if dictated by local conditions or flying season. While the Balloonmeister is encouraged to plan for flights to end within two hours after sunrise, this timeframe needs to be evaluated and established by each event based on local conditions and topography. Depending on local variables including geography, seasonal conditions and other factors, flight times after sunrise may be as short as one and one-half hours and as long as three hours. Pilots often apply pressure to start morning pilot briefings an hour before sunrise, so they have more time to find suitable launch sites should there be a fly-in flight or to ensure that they have ample time to land before the development or thermal conditions. It is very important for pilots to understand that there are many weather changes at or near sunrise; wind directions and speeds can change; fog can form; and, low level stratus clouds can form. If the Balloonmeister is to properly layout a flight plan and targets, he

needs to make some last-minute checks in the morning twilight. Scheduling morning briefings too early merely results in a series of briefing 'holds' that only serve to frustrate all concerned.

Sometimes it is appropriate to place pilots on 'hold' in expectation that weather conditions will improve. In these circumstances it is imperative that officials not lose sight of a flight plan ensuring the pilots' ability to land before the development of thermal activity and increasing surface winds. Depending on the weather analysis and the strength of inversion levels, the flight plan should provide for pilots to be on the ground before any anticipated thermal development. Also see thermal discussion in Section 4.9.

Evening flights should be planned around official sunset. Generally, flight activity should not be scheduled much more than two hours before sunset. Given the frequent need for 'holds' waiting for surface winds to die down, the launch window should close no later than forty-five minutes to one hour before sunset. Timing the closing of the evening launch window must also consider the availability of potential landing sites in the direction of flight.

Establish Quantifiable Guidelines for Success

Working with the Weather and Safety Officer develop a flight decision matrix within the framework of the event flying area and pilot skill set. Wind speed limitation guidelines for various altitudes from the surface up to 1,000' AGL considering the direction of flight and appropriate landing sites, minimum ceilings, visibility, distance from various levels of precipitation and thunderstorms, and latest morning and evening launch time in case of weather 'holds' are examples to consider for a pre-flight decision checklist. See Section 4.11 for detailed guidance.

Understand that the vast majority of balloon accidents are a direct result of deteriorating weather conditions, specifically high winds. Be certain that pre-flight planning considers the entire flight duration when establishing weather minimums.

Suitable Flying Areas Create Less Pilot Stress

The selection of a suitable flying area is paramount to having a successful event. While it creates an optimum situation if the venue has 360° of good flying area, it is not always possible. If there is an area that is unsuitable, and a flight will possibly head in that direction, it is the responsibility of the Balloonmeister to either cancel or change the flight plan if a flight in that direction would leave the pilot no suitable landing options. Prohibited Zones (PZs) should be marked clearly on the flying map and an explanation of these areas should be covered at the General Briefing. Reliable maps are essential; and while there are many varieties in use, make sure the one utilized is easy to read, has named roads, coordinates or grids clearly printed, and is large enough to read without a magnifying glass.

The launch field needs to be large enough to accommodate the number of balloons attending the event. If it is not large enough, launches may be in "waves" which will limit the available time in flight for the last wave to inflate and launch. Windy inflations in small confined areas create damaged balloons as well as other safety concerns. The launch field should be free of trash, litter, sticks, pot holes, and rocks and should have a good cover of grass, mowed and without an abundance of cut grass left on the surface which can create fires on inflations. The further away from power lines the launch area is, the better. There should be public address announcements and signage to make sure that all participants are aware of a "NO SMOKING" policy on the launch field. The launch field can be measured out in launch grids or open for the pilots to choose their own launch site.

Balloonmeister Decisions Involve Complex Dynamics

To fly or not to fly is always a necessary but difficult decision unless the weather is obviously ideal for balloon activities. Making the decision requires event officials to have a complete knowledge of the full scope of weather reporting. Since the flight window begins pre-dawn and continues for a period of two and possibly as long as three hours after sunrise, there are many factors to consider other than "what is the weather right now?" Weather is discussed in Chapter 4 in great detail and gives a full synopsis of what the officials need to consider in order to make informed decisions. Even more responsibility falls on the pilot to make a decision based on the information obtained from the officials as well as his own observations and personally gathered data.

The dynamic involves balancing the demands and expectations of the Organizer, sponsors and paid passengers with the risks of flight given the weather conditions. If the scheduled flight is for sponsors, VIPs or paid passengers, lower wind guidelines are appropriate given the inexperience and physical

fitness of the passengers. The officials will also feel the mood of the pilots regarding their personal analysis of the weather situation before entering the pre-flight briefing. It is the job of the Balloonmeister to assimilate information from all sources, analyze the weather with his officials, and make the final decision based on his experience and the safety of all: pilots, Organizer, sponsors, crew and the general public.

Waivers and balloon operation manuals, as well as the FARs, spell out minimum and maximum operating limitations for balloon activity. The aircraft's Operation Manual will also have 'do not exceed' or other limitations that have to be considered in respect to flights. While Balloonmeisters often have different views on how to officiate a particular event, there are some conditions that are standard to safe balloon flight. One standard, critical to safe flight, is the speed of surface winds, which are ideally 3 to 5 knots with no gusts. Most Waivers use a maximum of 10 knots at the surface with no gusts. Depending on other geographic and meteorological data, somewhere between calm and 10 knots is an acceptable surface wind speed. Wind speed at the surface and up to 6,000 ft. is the most commonly used wind measurement. Keep in mind that winds aloft forecasts are only updated three times daily. Use the upper air analysis cautiously. Use of a theodolite, Windsond or wind profiler will give the most reliable wind speeds and directions at higher altitudes. All of this information as well as RAP, VAD and forecast winds aloft can and should be supplied by the weather official.

The Go/No-Go Decision Involves the Balloonmeister and Pilot

While the initial decision to fly and open a launch window belongs to the Balloonmeister, the participating pilots must individually evaluate the weather information presented and make their own decision to fly or remain on the ground. The BFA's Hot Air Competition Division rules and regulations contain a type of 'safety valve' for pilots to protect them from errors in judgment by Event Officials or rapidly changing weather conditions developing after the briefing. Appendix D, Section I of the HACD regulations states ". . . At least 50% of the total pilots must launch in order for that task to be valid and included in the National Eligibility System."

All events are strongly encouraged to develop a similar policy. If a high percentage of participating pilots chose not to fly a particular flight, it indicates weather conditions were determined to be unsafe by a majority of the pilots. Any competition results of such a flight should be ignored relative to determining an overall winner of an event.

Determining an Appropriate Flight Window becomes very complex when weather is less than ideal. Morning flights are often put on hold in hopes of improving ceilings or visibility. Evening flights are often delayed waiting for winds to come down to more acceptable ranges and gusting to dissipate. Every minute of delay or 'hold' affects the flight window. The Balloonmeister need to balance the holding period with the announced flight plan or tasks of the flight. Oftentimes the officials and pilots lose sight of the hour in their excitement over the improving weather. Regardless of the delays, the flight plan must ensure there is enough time for all the pilots to complete the flight and land before high wind or thermal development or by sunset. The flight direction often plays a big role in this determination. The big question becomes, where will the pilots be when it's time to land?

An FAA Waiver Enhances Planning and Safety

If the event is relatively large, operating from or near airports or restricted airspace or a competitive event, an FAA Waiver is a necessary document. As mentioned in Chapter 8, these are obtained through the nearest FSDO and waived events are generally monitored by FAA officials. It is their mandate to protect the general population and event attendees as well as to qualify the airmen and their aircraft while having a safe, organized event. Integral to the Waiver is a Balloon Operations Manual. It needs to have all the information pertinent to the Waiver, schedules, prohibited zone information, details of allowable flight altitudes, emergency information, and other information that will assist the balloonists, crews, event officials and Organizers in producing a safe, well-coordinated event.

It is important to note that an FAA waived event does not allow 'passengers' in the traditional sense of the word. It does, however, permit passengers who have signed and fulfilled the requirements of the Designated Flightcrew Acknowledgement of Responsibility Form (see Appendix I). Paid passengers are permitted in accordance with 8900.1 CHG 86, 3-147 Y, Compensation at Air Shows as long as the pilot meets the stipulated standards of that section. Waivered events require that anyone carried on board during a flight be 'designated flightcrew,' must read the FAA Waiver and be briefed on its limitations, attend an official pre-flight briefing and sign off that they have been assigned specific crew duties in order

to be classified as a crewmember. Specific crew duties might be to be alert for power lines while flying at lower levels.

7.4 Weather Officer Decisions

Weather Officer's Responsibilities and Communication Skills

One of the most important people on the officials' staff is the person developing and delivering the weather information. This will be mentioned time and time again in this document. Why? Because we are a fair-weather sport and in order to be a safe sport, weather is one of the most important factors to be considered. While there are many factors involved, high winds are one of the biggest contributing factors to accidents.

The Weather Officer has an obligation to faithfully provide all pertinent information needed in balloon aviation weather. It is prudent for pilots to inquire about any unreported weather conditions they may have discovered as part of their personal weather check. With the availability of cell phones, wireless Internet and smart phones, it is not unusual for the pilots to access multiple weather sources for their own decision-making process. There are web sites that provide RAP winds, VAD winds, balloon specific weather observations, and general aviation weather reports as well as the FAA governed flight service stations. Weather forecasts can be subject to interpretation of the raw data supplied to the computer models and is not always completely reliable. While weather reporting has become more dependable and accurate in the last decade, "Mother Nature" does not attend the weather briefings and often does things her way without notification. Marginal weather for balloon operations should always be treated with a great measure of respect and apprehension.

Any individual serving as the Weather Officer who is not a professional meteorologist should never provide interpretations of the weather. They should merely report all the weather in a factual and concise manner. It's one thing for a professional meteorologist to say they believe NWS blew the forecast but it's quite another for anyone else to make that statement. Even if the professional believes the forecast is wrong, it is their obligation to report all official weather service information.

7.5 Pilot Decisions

Dynamics of the pilots participating in a balloon event are many and the Balloonmeister, officials and Organizer need an awareness of how they can affect the overall safety of the event. Flying at an organized event is quite different than flying at home alone or with several other area balloonists. The event Organizers and officials will have a certain level of expectation for a pilot's performance in exchange for all the amenities they have provided, i.e. rooms, propane, pilot pack, food and social events, prize money, paid rides, etc. Unless having attended a particular event before, flights will be in an unfamiliar territory, alongside unfamiliar pilots and in conditions perhaps never experienced before.

There may be an expectation to carry sponsors or other passengers that may make unreasonable demands. How many times have assigned sponsor passengers asked, "Can my husband/wife come along too?", "No one told me I couldn't fly because of last week's hip replacement surgery", and "My Mom won the ride and gave me the ticket." It is incumbent on the Event Organizer and Passenger Ride Coordinator to thoroughly brief all sponsor passengers on the limitations of the sponsor ride, as well as be certain that the pilots are also aware of the specific expectations of the pilots.

Local volunteer crewmembers may be unfamiliar with equipment, the preferred method of assembling equipment and the preferred inflation technique. They may be neophyte crew or their first time at a balloon event. There may be little or no knowledge of the weather official or his background. It's easy to get caught up in social events and meeting new aeronauts or old friends, eat and drink too much and get into bed at a very late hour. All of these can affect pilot judgment and flying ability. The Balloonmeister may have opened the flight window in weather conditions that exceed a pilot's skill set or personal limits. The 'lemming effect' can lead to poor decisions if personal limits or standards have not been established. A pilot should never fly without complete confidence in the situation. Pilots should feel free to discuss their personal go/no-go decisions with the Safety Officer or Balloonmeister. Honesty and complete candor are important when these decisions are made and discussed with crew, officials, Organizers or others.

With the advent of *Google Earth*, a pilot can familiarize himself with the event's flying terrain even if never having flown in the area. Pilot experience with this type of terrain or flying area should help the pilot

decide if this is an area exceeding the pilot's skill set. While it is important to periodically challenge and advance the current level of experience by stepping beyond current abilities, a reasonable comfort zone is still necessary to safely advance flying skills.

Taking experienced crew to out of town events is always the first choice, however, that is not always possible. If attending a balloon event without experienced crew and using the help of local volunteer crew, spend the time with them to clearly explain your methods and procedures such as radio etiquette, verbal commands, hand signals, descriptions of equipment, where items of importance are located in the chase vehicle and details of the chase vehicle operation. It is important to make sure crew understand the dynamics of crown line control, quick-release tie-off procedures, and emergency phone numbers as well as the correct procedures to follow in the case of an accident. All this information is contained in the publication *Hot Air Ballooning Crewing Essentials*, 83-90. The more knowledge pilots and crew have on the subject of power line safety, the more equipped everyone will be to avoid or handle difficult and dangerous situations involving power line strikes.

Many areas of the country have particular and unusual metrological conditions that differ significantly from the standards we have learned in flight training. If possible, discuss these weather conditions with a local pilot and get a thorough understanding of any localized climatic phenomenon or get a general understanding of local weather conditions.

Regardless of what the Balloonmeister calls, remember the PIC has complete responsibility to evaluate weather and make all decisions concerning the flight. The PIC must be comfortable with all aspects of the flight; there is no shame in staying on the ground. Sometimes that decision is the best choice and there is always another day, another flight, and better weather. Important considerations in the decision-making process are: surface winds; upper level winds; wind shears; flight duration and direction; potential landing areas; and the PIC's personal ability and readiness to perform this particular flight.

As mentioned several times and discussed in other chapters, weather conditions represent a critical factor in the flight decision-making process. The Weather Officer is expected to relay the very best and pertinent information of the flight conditions for the flight window. The FARs require the pilot in command to familiarize themselves with all the weather information required to perform a safe flight. If weather information obtained from other sources (the pilot should ALWAYS get an independent weather briefing) conflicts in any manner with that presented by the Weather Officer, it is the pilot's obligation as PIC to ask questions that will provide a full synopsis and explanation of any discrepancies. Be certain that the following are covered during the weather briefing: the area forecast, vicinity of thunderstorms, gusts, frontal movements, NOTAMs, SIGMETs, high and low pressure areas, pressure gradients, isobars, RAP model wind projections, VAD reports and current theodolite readings, if available. After obtaining as much weather information as possible, it is the PIC's decision to fly or remain on the ground. If unwilling to fly in current event conditions when at home, pilots should never accept marginal conditions when flying in unfamiliar territory.

If flying in a competitive flight and there is prize money on the line, do not allow prize money or placement in the standings to influence flight decisions. The same consideration is even more critical if flying paying passengers, as they do not have the same background and skills as the pilot or experienced crew in the event of a high wind landing or other type of incident or accident. If carrying passengers, know your balloon manufacturer's gross load limitations as they relate to density altitude. In addition, there are passenger limits, based on envelope size, imposed by insurance companies. Overloading a balloon is not only dangerous but it may void insurance coverage. For example, some insurance policies have maximum passenger guidelines such as: AX6 – two passengers; AX7 – three passengers; AX8 – four passengers (100,000 cubic feet or less) and five passengers (101,000 or greater cubic feet), etc.

Refueling balloons at an event can be a tedious task. The lines can be long and can sometimes move slowly. It is vital to everyone's safety to follow the instructions of the personnel overseeing the refueling station. Socializing in the immediate refueling area is not recommended. Organizers generally provide a crew drop off area safely removed from the refueling operations for post-flight camaraderie. Be prepared to follow the directions (including removing balloons from enclosed non-ventilated trailers), Have the balloon ready to fill, proceed in a thoughtful and efficient manner and depart the area as soon as cleared. The propane refueling area is potentially the most dangerous area at a balloon event. Do not take it lightly and be courteous to fellow pilots.

When attending an event, documentation will need to be presented regarding the aircraft's flight hours, annuals, repairs and inspections and various serial numbers for the component parts (envelope, tanks, basket, burner, and avionics) as part of the on-site registration process. Aircraft may suffer some minor or major damage during the event. It is the PIC's responsibility to be aware of the 'allowable damage' permitted by the aircraft manufacturer. This information is found in the flight operations/repair manual. Allowable damage generally involves minor burns, rips and tears in the fabric at lower portions of the balloon envelope. It is helpful to inquire of local pilots where a nearby repair station is located in the event a repair is necessary.

Chapter 8

FAA Regulations and Waivers

8.1 Certificate of Waiver – FAA Form 7711-2

The Certificate of Waiver is associated mostly with aviation events other than parachuting operations and constitutes a waiver of only those regulations stated, to the degree and for the period of time specified in the certificate. It is the formal document which allows balloons to fly below the minimum altitudes as prescribed by the FARs. In addition to lowering the minimum flight altitudes, the Certificate of Waiver also provides for an organized and documented approach to safety for an event. Instructions for Form 7711-2 stipulate that the Application for a Waiver is required to be submitted at least 90 days prior to the event and 120 days is recommended, so it requires the Organizers to work well in advance of the event to establish the personnel and guidelines for the event. Waivers are also the appropriate document to establish some of the event's weather guidelines and limits.

The Certificate of Waiver does not constitute a waiver of any state law or local ordinance. Should the proposed operations conflict with any state law, local ordinance, or required permission of local authorities or property owners, it shall be the applicant's responsibility to resolve the conflict. The specific provisions of the waiver issued by the FAA shall apply, regardless of the statements contained in the application for Certificate of Waiver. The Waiver expires upon completion of the authorized schedule of events or at the latest time shown on the face of the Certificate of Waiver, whichever occurs earlier. The air show will consist of only those maneuvers or events specified in Item 14 of the application, or in an attachment to the Application for Certificate of Waiver.

Waivers, and the filing of the appropriate NOTAM, are very important steps in establishing the existence of the balloon event and letting other aircraft know of the balloon flight activity. While balloon flights and events are held in VFR conditions, this does not necessarily guarantee other aircraft will see or know of the balloon activity. The Waiver and NOTAM officially notify all aircraft of the particulars of the planned balloon flights and it protects participating balloons from interference from other aircraft.

8.2 Determining If Your Event Needs a Waiver

Every event Organizer and Balloonmeister should ask themselves if they need a Waiver in the initial planning for an event. Any organized event is a candidate for a Waiver in order to give every participating pilot an opportunity to maintain compliance with the FARs. The answer depends upon a number of factors with the most important being: what type of area is the event being held in, congested or non-congested. If the event venue is within controlled airspace, how many balloons will be participating and, how many spectators will be attending the event. Events held in or near controlled airspace or competitive events need to have a Waiver. Organizers are encouraged to contact their local FSDO, discuss the specifics of the event, receive guidance on the determination of congested areas and discuss if a waiver would be appropriate.

Competitive events should request a Waiver in order to permit pilots to fly low over target areas and ensure proper control of all target areas. Festival-sport events or ride-based events need not operate under a Waiver if they are located in rural areas with little congested (built up) areas and well away from airports or other restricted airspace.

As a general statement, the FAA Waiver application and approval process will enhance the overall organization and safety of any balloon event. The FAA Waiver application process forces the Organizer and Balloonmeister to establish standards of safety in a number of areas including:

- Standardization of document examination and safety briefings
- Establishing controlled spectator areas as well as crowd control plans
- Establishing safe altitudes and a means of controlling any target areas
- Minimum weather standards are established including ceilings, visibility and wind speed
- NOTAMs are filed ensuring proper notification to air traffic control
- Communication on the launch field as well as pilot recall procedures are in place

FAA personnel are much more accustomed to and experienced in dealing with balloon flight than they once were. The event Organizer is encouraged to contact their local FSDO and discuss the Waiver process with FAA staff and make a determination of the need for a Certificate of Waiver.

8.3 Flight Standards District Office (FSDO)

FSDO offices, as they are commonly referred to, are the appropriate agency with which to file Waiver applications. They are field offices of the FAA which deal with certification and operation of aircraft. If not familiar with the FSDO responsible for the proposed event's flying area, local FSDO offices can be found at http://www.faa.gov/about/office_org/field_offices/fsdo/.

8.4 The Waiver Application

The FAA Form used for an Application for Certificate of Waiver is FAA 7711-2. A copy of this form and instructions on its completion is included in Appendix L. The form is available for completion and printing on line at <http://www.faa.gov/documentLibrary/media/form/faa7711-2.pdf>. It is the document which must be used when applying for a Waiver and the form should be completed with no omissions in information.

The first step in the application process is to identify the name of the Organization and the 'Responsible Person.' The responsible person must have been determined to be competent and knowledgeable concerning the terms and provisions of the Certificate of Waiver and the aviation event governed by the FAA. This person will be responsible to the FAA for the safe conduct of the event on all waiver matters. For air shows involving various forms of aircraft activity, this person is usually referred to as the air boss. Typically, the responsible person for balloon events is identified as the Balloonmeister.

The next important section of the application is a listing of the FARs requested to be waived. Those are listed by section and number. Generally, a balloon event Waiver asks for two sections to be waived: 14 CFR § 91.119 (b) Altitude over a congested area and 14 CFR § 91.119 (c) Altitude over other than congested area. You should review the most current version of FAA Order 8900.1, Volume 3, Chapter 6 (FSIMS) to determine all appropriate regulations.

Usually a full description of the sections to be waived is provided in an addendum to the application with details outlining the altitudes, restrictions, and clarifications. The list of "waiverable" regulations is found in 14 CFR Part 91.905.

Item 8 of the application asks for the area of operation of the event. Refer to FAA Order 8900.1, Volume 3, Chapter 6 [FSIMS 3-143 A (46) and 3-152 C (2)], for requirements of show line and reference line distances from spectator areas. Information required for this item includes: exact latitude and longitude of the primary launch field/headquarters; flight operation areas usually expressed as a nautical mile radius from the primary launch field; and, upper altitude limit expressed in MSL or AGL. In addition to the lat/lon of the launch field, the location should be expressed in terms of location relative to the nearest VOR station, e.g. 4.2 nautical miles from the Briggs VOR on the 359° radial (True).

FAA guidance to complete an Application for Waiver is available from Flight Standards Information Management System (FSIMS), Advisory Circular AC 91-45C, and FAA Compliance and Enforcement Program Order 2150.3B. The details of this guidance are found in 3-152, page 50 of FSIMS and are too extensive to replicate here but the entire publication is available for download at: http://fsims.faa.gov/wdocs/8900.1/v03%20tech%20admin/chapter%2006/03_006_001.pdf.

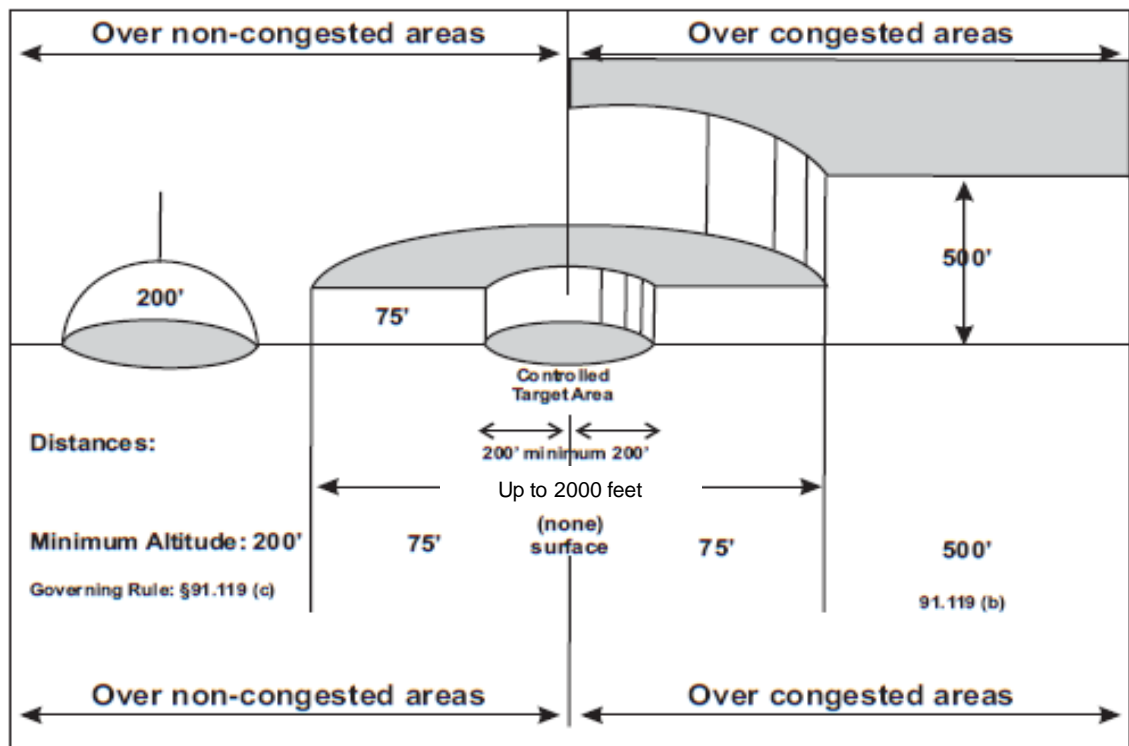
8.5 Allowable Minimum Altitudes

The following are the allowable minimum altitudes permitted when flying under an approved Certificate of Waiver.

§ 91.119(b) may be waived to allow flight over a congested area at an altitude of no less than 500 feet above the highest obstacle within a 500-foot horizontal radius of the balloon. This section of the regulation may only be waived within a specified maximum distance from designated launch sites and/or target areas. This designated area will be determined by the event Organizer and the FAA; this area must also be clearly delineated in the event Organizer's manual before the event. (A scaled map, drawing, and/or aerial photographs should be in the event Organizer's manual before the event.) The designated area should be the minimum area necessary to accommodate the event, and the area should be consistent with the event Organizer's ability to control operations.

§ 91.119(b) may be waived to allow flight above, but not less than 75 feet from, any open-air assembly of persons (designated spectator area) under the direct control of the event Organizer. A waiver of § 91.119(b) will not be issued if the target area is so small that a normal descent (200 to 300 feet per minute) cannot be made.

Minimum Altitude Diagram



8.6 Balloon Competition Manual

To be found eligible for a waiver of § 91.119(b) and (c), the Organizer (applicant) must prepare and maintain a Balloon Competition Manual that has been found acceptable by the FSDO with jurisdiction over the event. The contents of the manual are the basis for issuance of the Waiver. Throughout the event, the applicant and the participants must comply with the balloon manual contents and requirements. No operations can be conducted under a Waiver except while in VFR conditions during the period from sunrise to sunset, as specified in § 91.155.

In essence, the Balloon Competition Manual is the operations manual for the balloon event. It's the plan to ensure a smooth running and safe aviation event. The following is a list of the minimum required topics that must be addressed in the competition manual for a balloon event.

Responsibilities and Procedures

- Duties of personnel
 - Event Organizer
 - Balloonmeister
 - Operations/Crowd Control Official
 - FAA Liaison
 - Weather Officer
 - Safety Officer
 - Flightcrew Member Safety Briefer
- Registration and airworthiness determinations
- Pilot and event Flightcrew member qualifications
- Pilot/crewmember briefing responsibilities
- Copy of letter(s) of agreement
- Event documentation

Ground Operations

- Clear areas
- Spectator areas (designated primary and potential secondary areas)
- Crowd control requirements
- Landowner relations/notification

Flight operations

- Areas of operations
- Types of operations
- Altitudes and minimum altitude diagram
- Weather requirements
- Communications requirements
- Air Traffic coordination

Maximum Wind Speed

The maximum wind speed for launch and at the target zones is mutually determined by the Balloonmeister and the FAA. These limitations are to be included in the Balloon Competition Manual. Determine the maximum wind speed limitations after considering the local terrain conditions and the competency of the participating airmen and the limitations of the aircraft. If a balloon does not have an FAA-approved flight manual available for inspection, operating limitations can also be found on the Type Certificate Data Sheet (TCDS). The actual means of determining the wind speed must be mutually agreeable to the FAA and the event Organizer. The FAA monitor and/or the Balloonmeister may wish to consider moving the designated spectator area barriers if the wind speed becomes excessive.

Types of Competitive Tasks

Competitive tasks are exercises in navigation using changes in wind direction. The winner of a task is the balloonist who can best take advantage of changes in wind direction by ascending and descending. Event Organizers generally engage launch directors to control staggered launch times and ensure safety for multiple launches. The Balloon Competition Manual must include a description of the planned competitive tasks. In addition, the rule book being utilized is to be included as an attachment to the Manual.

Typical Attachments

In addition to the Balloon Competition Manual, the following are typical attachments needed to be included in the Application for Certificate of Waiver:

- Sectional of Area
- Competition map
- Launch Field Diagram showing target and designated spectator areas
- List of Pilot Entries
- Schedule of Events
- Emergency Response Plan
- Security Plan
- Aircraft and Participant Checklists
- Statement of Responsibility
- Competition Rules

8.7 Designated Flightcrew Acknowledgement

Background

The first hot air balloon Waiver used in the United States was in 1985 at the World Hot Air Balloon Championship in Battle Creek, MI. Aside from balloon events, if a Waiver is issued for fixed wing aircraft, usually an air show or some other public type of display is involved. Again, generally speaking, in an air show fixed wing aircraft are participating in flights and maneuvers much closer to the ground and spectators than during their usual flight operations, and that flight would be more 'dangerous' than the aircraft's usual flight operation. In these cases, the FAA mandates that only 'Necessary Flightcrew' to complete the flight operations be onboard the aircraft operated under the Waiver; these Necessary Flightcrew are required to sign the Flightcrew Waivers acknowledging the dangers associated with that flight.

As this has been extended to balloon event Waivers, the same requirement of Designated Flightcrew Acknowledgement has generally been enforced, although it is not usually applicable in the same sense as described above. Please remember that most FARs are written for fixed wing aircraft and not balloons specifically, and the Waiver, while it is tailored in some areas for a balloon event, is still viewed and graded for 'aircraft.' An example of a Designated Flightcrew Acknowledgement can be found in Appendix I.

Waiver Requirements for 'Designated Flightcrew'

Only pilot and event Flightcrew members, as described in the Balloon Competition Manual, may be carried onboard any balloon operating under the Waiver issued to the event Organizer. In addition,

1. Event Flightcrew members should be kept to a minimum and that limitation must be noted in the Balloon Competition Manual.
2. All event Flightcrew members must have received appropriate training concerning their duties relative to the event. These crewmembers must sign a statement that they have been briefed and that they are designated event flightcrew members for the purpose of the specific event for which the waiver was granted. Event Organizers must ensure that all designated flightcrew assigned by them (sponsors or paid riders) have read the event waiver and attend a pre-flight briefing.

Pilots inviting their crew, family members or others to serve as designated flightcrew are required to ensure that they have read the event waiver and attend a pre-flight briefing.

3. The PIC of each balloon is responsible for obtaining the signed statements on a form furnished by the event Organizer. The PIC will maintain this form during the event and return it to the event Organizer and make it available to the FAA upon request.
4. Balloon event flightcrew members are differentiated from ground support launch and recovery crew members.

8.8 Minimum Weather Conditions When Operating Under a Certificate of Waiver

While it is important for each event to establish their own weather minimums whether operating under a Certificate of Waiver or not, these are the minimums required when operating under a Waiver.

1. Flight demonstrations will not be conducted unless the ceiling is at least 1,500 feet, and the visibility is at least 3 statute miles at the time of the demonstration.
2. The FAA Inspector in Charge (IIC) monitor may adjust the minimum ceiling and visibility requirements at his or her discretion (Special VFR), but no less than 1,000 feet and 3 statute miles
3. The FAA IIC monitor may specify a higher ceiling minimum and a higher visibility minimum where justified by the presence of surrounding terrain or other local condition.
4. Flight demonstrations may be conducted "clear of clouds" when the requirements have been met to waive § 91.155, cloud clearance requirements. Generally, this is only permitted when approved by an on-site FAA event monitor as is referred to as a 'special VFR' waiver.

8.9 Special Provisions

Special provisions are conditions, requirements, or limitations deemed necessary to protect nonparticipating persons, property on the surface, and other users of the national airspace system. Each Certificate of Waiver or Authorization includes special provisions as determined by the issuing FSDO. Examples of common special provisions can be found on the Internet at: <http://www.faa.gov/about/initiatives/airshow/waiver/>.

8.10 NOTAMs (Notice to Airmen)

Once a Waiver has been issued, the Waiver holder needs to file a NOTAM with the Lockheed-Martin Flight Service Station NOTAM desk. The NOTAM desk can be reached by calling 1-800 WX-BRIEF and the call will be routed to the desk or call the desk direct at 1-877-487-6867 (note the desk is not manned 24/7). The Waiver holder needs to file the NOTAM no less than 48 hours before and no more than 72 hours before the beginning of the event.

The NOTAM desk will need the following information: dates and times of the event, the location of the event, the areas and altitudes of the flights, the nature of the flight activity, and the duration of the operations. The NOTAM desk may ask to have a copy of the Waiver sent to them and it can be faxed to the desk at 1-571-223-1593, or mailed to Lockheed-Martin Information Technology, Attn: Manager, 43881 Devin Shafron Drive, Ashburn, VA 20147.

8.11 Ramp Checks

Ramp checks are conducted as spot checks to ensure compliance with the Code of Federal Regulations (CFR). They involve a check of the airworthiness status of the aircraft and the qualification of the pilot(s). Ramp checks are conducted randomly at various airports and are also conducted specifically at aviation events where aircraft operate under a waiver.

A Waiver to the CFR is issued only when other provisions are made that provide for a level of safety at least equivalent to the rule that was waived. These provisions are incorporated as a part of the Certificate of Waiver (i.e., Special Provisions). One of those special provisions specifies a time and place for pilots to present their aircraft and documents for FAA inspection. At an airshow, that's easily done. There's usually not more than a dozen or so aircraft and all the performers are accustomed to and organized for FAA ramp checks. At balloon events that's not necessarily so. It's usually far more than a dozen or so aircraft; they all show up at once; they're in a hurry because of the need to brief, set up, and go. Generally, FAA representatives try to arrange the inspection time a couple of hours before the briefing and set up stations where the pilots can bring their documents for inspection. Physical checks of the aircraft are randomly conducted by observing the set ups at launch or at an evening glow. If it's later in the year and most of the pilots and aircraft have already been checked several times that year, the FAA confidence is increased, and the checks are less intense. New requirements of FSIMS issued in 2018 require event Organizers to collect airman and aircraft documentation weeks before the event, provide it to the FSDO so that they can conduct cross-checks in their database, removing the need to conduct a "check-in inspection" except for those who didn't provide their documentation in advance. Organizer

FAA Inspectors should not unduly delay a crew during a launch or recovery to inspect the aircraft or documents. The Inspector should not distract the pilot or crew while they are performing critical safety tasks. Likewise, the pilots and crew should not use this as a way to avoid a ramp check. If an aircraft is chosen, it will be checked. If the crew is organized, it should go quickly and smoothly.

During the ramp check process, the FAA is looking for the following documents on the balloon system: aircraft airworthiness - valid airworthiness and registration certificates; maintenance records that reflect an annual (and 100-hour, if applicable) inspection on the system, envelope, basket, burner, tanks. Those who swap "bottom ends" frequently may need to bring extra documentation. The aircraft should not have damage or conditions that render it unairworthy or unsafe for flight.

The following pilot qualifications are reviewed during the ramp check process: valid airman certificate appropriate for the operation, current flight review, three takeoffs and landings in the last 90-days if carrying passengers (balloon pilots are notorious for logging flights but not landings).

8.12 Order 8900.1 Flight Standards Information Management System (FSIMS)

The FAA is expected to incorporate new guidance into Volume 3, Chapter 6, Section 1 to clarify the process of applying for a Certificate of Waiver or Authorization for an aviation event, and incorporates information from Notice N 8900.231, Certificate of Waiver for an Aviation Event—Air Race. The new guidance includes extensive changes and additions to the old guidance. Every Organizer and event official responsible for filling an Application for Waiver must become thoroughly familiar with this guidance. It's anticipated that the new FSIMS guidance will be published in March 2018.

The following are major changes to FSIMS that impact balloon events.

- 3-142 B The Event Organizer must submit applications at least 90 days before the event; 120 days is recommended
- 3-143 A: Greatly expanded the list of definitions that now include Balloonmeister, Airworthiness Certificate, Balloon Event Flightcrew Member, Chase Crew, Crowd Line, Launch Directors, Markers, Primary and Secondary Spectator Area(s), and UAS Aircraft
- 3-144 A (1): Event Organizer must include an acceptable emergency response plan and security plan with the application for CoW.
- 3-144 A (10): Diagrams and descriptions submitted must also include: static display areas, location of UAS ground control station, location of crash, fire and rescue personnel on site and at designated location for parachute landing areas and pyrotechnic areas, diagram of launch field for mass ascensions, target area and zones designated for public viewing. If spectators have access to a launch field during balloon launch activities, a description of method of protection of the public.
- 3-145 A: Thirty days before the event date, the event Organizer will send the local FSDO copies of the pilot, aircraft and parachute documentation. The documentation checklist is provided in Figure 3-203 of FSIMS.
- A pilot is required to have their records reviewed and aircraft inspected onsite at least one time during the aviation event season.
- 3-147 X
 - X (1): To receive any type of compensation **for flight activities** at an aviation event, an airman must have a Commercial Pilot Certificate . . .
 - X (3): Prize money awarded on the basis of competition is not compensation
 - X (7) b (2): Clarifies that 14CFR §91.147 does not apply to balloon events.
- 3-152 A: Regarding balloon activities conducted outside of daylight hours, balloons must be lighted, per 14CFR §91.209, except for ground-based static displays where the basket is not intended to leave the ground. For night tether operation, a light system meeting the requirements of 14CFR.
- 3-152 C (1): Balloon landings are not normally permitted closer than 650 feet (200 meters) from the target or goal, although event officials may allow a reduction of this distance as deemed necessary for safety considerations. These distances were lowered but also require a safety briefing.
- 3-152 J: New guidance distinguishes between basket and envelope banners. Basket banners are for identification purposes and is not considered a commercial operation.

- 3-152 K: If a pilot receives any type of compensation **for flight activities** at a balloon event, that airman must hold at least a Commercial Pilot Certificate.
- 3-152 K (1): Propane supplied to participants at a balloon event for a small fee (e.g. event entry fee) is not considered compensation.
- 3-152 K (2): Other items (e.g. meals and lodging) that are provided regardless of whether the pilot flies or not are not considered compensation under § 61.113.3-152 K (3): If the pilot is required to carry a member of the press, Organizer's committee, or one of the sponsors for the event, and none of these people have paid for a ride, except the sponsor, who may have donated resources in order for the event to take place, and the pilot does not receive any additional compensation for taking the passenger above and beyond what is given to all other participants, the pilot is not operating an aircraft that is carrying passengers for compensation or hire.

Chapter 9

Operations Manuals

Pilots and crew attending an event for the first time are often completely confused on where to register and wondering what's the event timetable, who are event officials, what are the rules, how to get from the hotel to the launch field, where is propane, etc., etc.? A well-organized event should prepare an "Operations Manual" containing the entire event's critical organizational and logistical information. This material, in large part, should be made available to the participants and officials in advance of the event in either printed form or as a pdf download from the event's website.

Every event has its own way of doing things as well as a variety of activities. The Operations Manual should contain all information pertinent to the participating pilots. Below are some examples of items to be considered for inclusion in an Operations Manual:

Welcome Letters

Welcome letters from the Event Organizer (Chairman), Balloonmeister and local officials are always appropriate and make the pilots and crew feel welcome to the community.

Event Schedule

This is a critical item for inclusion in the Operations Manual. The schedule should contain only those items pertinent to the pilots and not include general public information or related events. The following are good items to include in the schedule's timetable organized by event day and date:

- On-site registration time and location
- Pilot meeting times and locations including the first day's General Briefing
- Official sunrise and sunset times
- Details for time and location to match up with sponsor riders, paid rides, etc.
- Propane refueling time and location
- Scheduled hospitality times including: breakfast, before or after flight meals and socials
- Details of related activities that impact the pilots including: tethers, skydiver demonstrations, fireworks, etc.
- Other, depending on activities of the event

Sponsor Flight Details

Most events require an obligatory flight for a sponsor. The Manual should contain details of these obligations as well as information on how the sponsors will be briefed (required for FAA Waivered events), where the pilot will be matched with and meet the sponsor and any other specific details relating to the sponsor flight.

Event Staff, Officials and Emergency Contacts

Names of all event staff along with their title and phone number should be included to facilitate a pilot needing to contact staff with critical questions. In addition, emergency contacts and phone numbers should be included. These might include: lost balloon number, emergency services, local law enforcement and electric companies.

Maps

Maps depicting critical pilot information: hotel, primary launch field with pilot ingress and egress, propane, pilot briefing and registration areas. If weekend events take place in other remote locations be sure to provide mapping and travel directions.

Details of the event pilot maps should be provided. Some critical information would include: map datum and scale, magnetic deviation, launch field elevation, and coordinates for any targets located at the primary launch field.

Pilot List

A list of participating pilots should be included and arranged by assigned pilot number. It's also a nice addition to include the home town and state of the pilot.

Auxiliary Pilot Activities

If the event includes dawn patrols, glows, media flights, etc. details of organization and pilots registered for those specific activities should be listed in the Manual

Prize Fund

If the event offers prizes or a prize fund, those details should be included in the Manual as well as details of how winners will be determined and any adjustments (if any) to the awards should flights be weathered out.

Pilot Recall Procedure

The ability to contact pilots in a timely manner is a critical safety item for all balloon events and should be taken seriously by Organizers and officials. Details of the recall procedure in place should be included along with any special codes used and their meaning.

Airspace

If the event is in or near restricted airspace, a graphic of the applicable 'sectional' should be included. In addition, the following information should be included:

- ATC Frequencies
- ATIS Frequency
- ASOS Frequency

Prohibited Zones (PZs)

PZs should be detailed and identified by a number that corresponds with the area outlined on the pilot map. In addition to the numerical reference, each PZ should include the landowner's name and address, PZ reason (livestock, crops, etc.), classification (red or yellow), minimum altitude (red PZ), and the coordinate reference (either UTM or lat, lon). Google Earth satellite photos of PZs showing property outlines is often helpful

Propane Logistics

Specific rules of the event and local municipality relating to propane refueling will be important to all pilots and crew. Refueling times and locations should be included along with the name and phone number of the contact person assigned to monitor and control the area.

FAA Approved Certificate of Waiver

If the event is operating under an FAA Waiver, the approved Waiver along with its Special Provisions should be included in the Operations Manual. In addition, the 'Balloon Competition Manual' (see Section 8.6) should be included for the pilots' reference.

Rules

No matter what format the event follows (competitive, ride-based, or festival-sport), rules should be developed to govern the critical aspects of the event and any 'races' to be run by the Balloonmeister. Many competitive events are governed by rules developed by the BFA/HACD and they are available for download from the BFA's website. Even if the event does not have 'serious' competition, these rules can be edited to fit the circumstances of any event. The HACD also provides a set of "Simplified Rules" for weekend event."

While the development of a complete Operations Manual is time consuming, once an event develops a good working document it only needs to be updated from year to year. An informative Operations Manual will be greatly appreciated by everyone associated with a hot air balloon event.

Chapter 10

Pilot Decision-Making and Risk Management

10.1 Chapter Overview

This publication contains a wealth of information for Organizers and event officials aimed at improving their decision-making process toward a goal of safer balloon events. In the final analysis, however, safety starts and ends with the pilot in command. The FARs 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 regard 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.

10.2 Aeronautical Decision-Making

Aeronautical decision-making (ADM) is 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. Learning effective ADM skills can help a pilot offset the one unchanging factor that remains despite all the changes in improved flight safety—the human factor.

ADM builds on the foundation of conventional decision-making but enhances the process to decrease the probability of pilot error. ADM provides a structure to analyze changes that occur during a flight and determine how these changes might affect a flight's safe outcome. This process includes identifying personal attitudes hazardous to safe flight, learning to recognize and cope with stress, developing risk assessment skills, and evaluating the effectiveness of one's ADM skills.

Hazardous Attitudes and Antidotes

A hazardous attitude, which contributes to poor pilot judgment, can be effectively counteracted by redirecting that hazardous attitude so that correct action can be taken. Recognition of a hazardous thought is the first step toward neutralizing it. After recognizing a thought as hazardous, the pilot should label it as hazardous, and then state the corresponding antidote. The antidotes for each hazardous attitude should be memorized so it automatically comes to mind when needed. Each hazardous attitude with its appropriate antidote or learning modification is shown in this graphic.

Learning How to Recognize and Cope with Stress

An important component of the ADM system is the ability to recognize stress. Stress is a term used to describe the body's nonspecific response to demands placed on it. Stress can be emotional, physical, or behavioral, and it is important for a pilot to become knowledgeable about stress and how to cope with it.

Developing Risk Assessment Skills

An examination of the National Transportation Safety Board (NTSB) reports and other accident research can help a pilot to assess risk more effectively. For example, studies indicate the types of flight activities that are most likely to result in the most serious accidents. For balloons, landing accidents consistently account for over 80 percent of the total number of accidents in any given year.

These accidents consistently account for the majority of injury to pilots and damage to balloons. Accidents are more likely during landing because the tolerance for error is greatly diminished and opportunities for pilots to overcome errors in judgment and decision-making become increasingly limited, particularly in high wind conditions. The most common causal factors for landing accidents include collision with obstructions in the intended landing area. Prior to a flight, a pilot should assess personal fitness. The "I'm Safe Checklist" helps a pilot determine his ability to fly.

HAZARDOUS ATTITUDES	ANTIDOTES
<p>Macho—Brenda often brags to her friends about her skills as a pilot and wants to impress them with her abilities. During her third solo flight she decides to take a friend for a balloon ride.</p>	<p>Taking chances is foolish.</p>
<p>Anti-authority—In the air, she thinks "It's great to be up here without an instructor criticizing everything I do. His do-it-by-the-book attitude takes all of the fun out of flying."</p>	<p>Follow the rules. They are usually right.</p>
<p>Invulnerability—Brenda soon realizes that the winds are much stronger than she had thought and in a different direction than forecast. But she feels confident that her skill will still allow a long flight from the launch site so she can show her friend the countryside. She thinks, "It's no more difficult than many of the flights with my instructor."</p>	<p>It could happen to me.</p>
<p>Impulsivity—While flying low over a neighborhood preparing to land, Brenda notices a number of adults and children in the middle of the street watching the balloon pass overhead. She decides to descend even lower, to rooftop level, to impress both the spectators and Sarah, her passenger. As she levels out, she notices the power lines running just below the treetops and narrowly misses one of them.</p>	<p>Not so fast. Think first.</p>
<p>Resignation—At the end of a local flight, Brenda does not adequately plan for a fast, hard landing. She fails to vent sufficiently on touchdown, and ends up draping the balloon envelope over the trees on the far edge of the landing area, with no damage. As she and her passenger exit the balloon, she says to herself, "Oh well, it's all part of learning to fly."</p>	<p>I'm not helpless. I can make a difference.</p>

10.3 Risk Elements

The FAA publication *Risk Management Handbook* (FAA-H-8083-2) is an excellent source to assist pilots in critical event risk management decisions. Once a pilot identifies the risks of a flight, he needs to decide whether the risk or combination of risks can be managed safely and successfully. If not, make the decision to cancel the flight. If the pilot decides to continue with the flight, he should develop strategies to mitigate the risks. One way a pilot can control the risks is to set personal minimums for items in each risk category. These are limits unique to that individual pilot's current level of experience and proficiency.

Pilot Risk Factors: The first and key step in preparing for any challenging situation is to recognize that one may not have the required skill set - the step of recognizing personal limitations. The next step is acquiring that skill set.

One of the best ways pilots can mitigate risk is a self-evaluation to ensure they are in good health. A standardized method used in evaluating health employs the IMSAFE checklist. It can easily and effectively be used to determine physical and mental readiness for flying and provides a good overall assessment of the pilot's well-being.

1. Illness - Am I sick? Illness is an obvious pilot risk.
2. Medication - Am I taking any medicines that might affect my judgment or make me drowsy?
3. Stress - Am I under psychological pressure from the job? Do I have money, health, or family problems? Stress causes concentration and performance problems. While the regulations list medical conditions that require grounding, stress is not among them. The pilot should consider the effects of stress on performance.
4. Alcohol - Have I been drinking within 8 hours? Within 24 hours? As little as one ounce of liquor, one bottle of beer, or four ounces of wine can impair flying skills. Alcohol also renders a pilot more susceptible to disorientation and hypoxia.
5. Fatigue - Am I tired and not adequately rested? Fatigue continues to be one of the most insidious hazards to flight safety, as it may not be apparent to a pilot until serious errors are made.
6. Emotion - Have I experienced any emotionally upsetting event?



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 PZs 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 FARs or the event Waiver.
3. Check the airspace and any temporary flight restrictions (TFRs) 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. Event Organizer and sponsor pressures
4. A paid ride excursion with a significant financial reward
5. The desire to demonstrate pilot qualifications
6. The desire to impress someone (probably the two most dangerous words in aviation are "Watch this!")
7. Desire to satisfy a specific personal goal ("target-fixation," and "how fast can I climb? Descend?")
8. A pilot's general goal-completion orientation
9. The 'lemming' effect. "It looks like everyone else is flying; I'm sure I can handle this wind."
10. 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 (SOPs) 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.
- Manage Organizer and sponsor expectations. Be prepared to explain your aircraft's limitations and load limits given the temperature and density altitude of the day.

10.4 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 flightcrew, 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 input. 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 Balloonmeister 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

		Severity			
		Catastrophic	Critical	Marginal	Negligible
Likelihood	Probable	High	High	Serious	
	Occasional	High	Serious		
	Remote	Serious	Medium		Low
	Improbable				

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.

10.5 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 5-5) in all decision-making, it becomes natural and results in better decisions being made under all types of situations.

1. **Detect:** The decision maker detects the fact that change has occurred.
2. **Estimate:** The decision maker estimates the need to counter or react to the change
3. **Choose:** The decision maker chooses a desirable outcome (in terms of success) for the flight.
4. **Identify:** The decision maker identifies actions which could successfully control the change.
5. **Do:** The decision maker takes the necessary action.
6. **Evaluate:** The decision maker evaluates the effect(s) of his/her action countering the change.

10.6 A Practical Approach to Event 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 Balloon Event Guidelines is, however, to provide guidance specifically related to hot air balloon event flying. The overall model of decision-making is not to be ignored but the following represent unique situations found at balloon events. They should be considered carefully and integrated into the pilot's skill set.

Let's consider for a moment what is different or potentially different when flying at a hot air balloon event. Here are some common balloon event occurrences and they each create a unique set of variables that could impact our flying:

Pre-Event and Pre-Flight

1. Events are generally located in another town and can be anywhere from a few miles to several hundred miles from our home flying area. Oftentimes we arrive tired.
2. If this is the first time to attend this event expect to get lost several times and be completely confused by the Organizer's lack of logistical information. Can you feel the frustration?
3. Ballooning is our hobby, our passion; for most of us, another job pays our bills. We need to take time off work or leave and rush to the event to register and participate in Friday evening activities. We can be rushed and stressed before the first flight.
4. Events often mean flying in areas foreign to us – higher altitudes, mountains and valleys, large bodies of water, swamps, forests, airports and restricted airspace, and highly congested areas.
5. We will be flying in congestion with as many as 100 to several hundred other balloons.
6. We will get our primary guidance and weather from individuals of which we may have no previous knowledge.
7. At the first briefing on Friday evening we learn of several 'hot' landowners in the area and those areas are scribbled on a County map in the front of the room.
8. At that same meeting, we are asked to fly a sponsor weighing 360 pounds and a local TV cameraman.

Social Based Influences

1. A significant reason for attending balloon events is to share in the camaraderie with other pilots and crew. Oftentimes pilots and crew are up late at event dinners and parties and enjoying alcoholic beverages.

2. Every balloon event has an ensemble of unique personalities: the “been-there-done-that” guy, the “weather expert” who just ‘knows’ we won’t fly in the morning, the “daredevil” ready to fly and show others how it’s done, the “party-bunch” more interested in happy hour than taking care of business, and the “lemmings” ready to do what everyone else does.
3. When weather is good, and pilots are flying day and night and socializing it makes for very short nights. A lack of sleep can have a significant impact on the decision-making process.

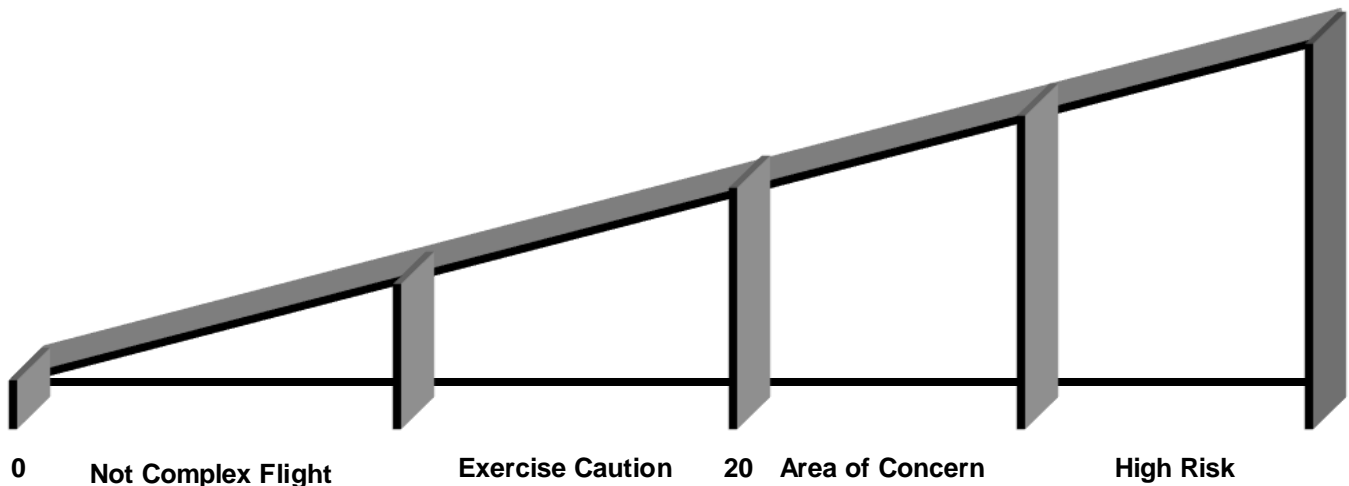
Unique Launch, Flight and Landing Situations

1. The common launch field is tight and pilot etiquette seems to be missing when laying out for launch.
2. Balloons are expected to layout next to fence lines that could come into play given sudden wind gusts or direction changes.
3. Surface wind speeds discussed by the Weather Officer may exceed the pilot’s personal comfort level.
4. Surface winds are expected to remain 8-10 knots or less. The only winds aloft data are the forecast levels of 3, 6, and 9,000. The 3,000’ forecast is 22 knots. This scenario is wrought with potential bad decisions from passing up a good flight to flying and experiencing dangerous high-wind landings.
5. The flight and targets assigned by the Balloonmeister will take the pilots into difficult landing areas. Do I continue to work to get to all the targets or do I land safely and give up on the later targets?
6. The planned flight profile will require two ascents to at least 5,000 feet AGL and back to the surface to accomplish the tasks. Do I have enough fuel for those maneuvers? Am I willing to make rapid ascents and descents to reach the goals?
7. The early morning winds are expected to remain less than 10 knots, but wind speed will increase significantly within one to two hours after sunrise. The Balloonmeister has asked the pilots to make a short hop and land at their first opportunity. The flight direction will take the flight past some congestion and towards a large swamp area. Do I risk a short flight or elect to stay on the ground?
8. An evening flight has been placed on hold twice awaiting surface winds to decrease and gusts to stop. Paid passengers are available, and you have booked three for a fee of \$600. The field is opened with forty minutes to sunset and the flight is headed toward some wooded areas with sparse landing sites. The passengers are fine with a thirty-minute flight.

10.7 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. A worthwhile exercise would be to complete the model for some events attended in the past and see how decisions fared against the model. 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 (e.g., 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.

Personal Risk Assessment Model for Balloon Events	
Sleep: <input type="checkbox"/> 2 Did not sleep well or less than 5 hours <input type="checkbox"/> 1 Slept OK but only 6-7 hours <input type="checkbox"/> 0 Slept well	How do you feel? <input type="checkbox"/> 4 Have a cold, bad allergies, ill or suffering from effects of alcohol even if 'legal' <input type="checkbox"/> 2 Feel a bit 'off' <input type="checkbox"/> 0 Feel good
How is the day going? <input type="checkbox"/> 3 Seems like one thing after another, lots of drama <input type="checkbox"/> 0 Great day	
Currency: <input type="checkbox"/> 3 Just recently current after long layoff <input type="checkbox"/> 0 Several take offs and landings in past 30 days	Passenger briefings and load calculations: <input type="checkbox"/> 0 Passengers briefed on all aspects of flight <input type="checkbox"/> 2 Passengers not briefed on all aspects of flight
Pre-flight weather briefing: <input type="checkbox"/> 2 Rely solely on event weather briefing <input type="checkbox"/> 0 Called flight service or used computer for full personal briefing	<input type="checkbox"/> 0 Weight & balance verified (density altitude) <input type="checkbox"/> 3 Weight & balance not verified (density altitude)
Morning flight weather report	Evening flight weather report
<input type="checkbox"/> 2 Current surface winds 8-10 kts <input type="checkbox"/> 4 Current surface winds >10 kts <input type="checkbox"/> 4 Upstream thunderstorms present <input type="checkbox"/> 2 Weak inversion expected to break down early <input type="checkbox"/> 2 Ceilings <2,500' or visibility <6 miles <input type="checkbox"/> 4 Ceilings <1,500' or visibility <3 miles <input type="checkbox"/> 0 Forecast remains favorable throughout flight period <input type="checkbox"/> 4 Forecast contains precipitation, turbulence or increasing winds <input type="checkbox"/> 0 Winds aloft <15 kts below 700' AGL <input type="checkbox"/> 4 Winds aloft >15 kts below 700' AGL <input type="checkbox"/> 0 Flight will be complete within 2 hours <input type="checkbox"/> 2 Flight will require >2 hours to complete <input type="checkbox"/> 3 Flight direction is congested, heavily PZ'd, wooded, swamped, etc.	<input type="checkbox"/> 2 Current surface winds 8-10 kts <input type="checkbox"/> 4 Current surface winds >10 kts or gusts remain <input type="checkbox"/> 5 Upstream thunderstorms present <input type="checkbox"/> 2 Ceilings <2,500' or visibility <6 miles <input type="checkbox"/> 4 Ceilings <1,500' or visibility <3 miles <input type="checkbox"/> 0 Forecast remains favorable throughout flight period <input type="checkbox"/> 4 Forecast contains precipitation, turbulence or increasing winds <input type="checkbox"/> 0 Winds aloft <15 kts below 700' AGL <input type="checkbox"/> 3 Winds aloft >15 kts 500 - 700' AGL <input type="checkbox"/> 6 Winds aloft > 20 kts 500 - 700' AGL <input type="checkbox"/> 3 Winds are likely to go light & variable <input type="checkbox"/> 0 Launch time to sunset $\geq 1 \frac{1}{2}$ hours <input type="checkbox"/> 2 Launch time to sunset $\frac{3}{4} - 1 \frac{1}{2}$ hours <input type="checkbox"/> 4 Launch time to sunset $< \frac{3}{4}$ hour
	TOTAL SCORE (include only one weather)



Appendices

Disclaimer

Appendices A through L contain suggested formats for various forms and documents often used by hot air balloon events. These are samples designed to include the information experienced event Organizers and officials find critical.

Many of the sample forms include specific legal language related to assumption of risks and release of liability. The samples included contain language found to be successfully defended in court cases. It is important to note, however, that State laws vary and change. All legal forms should be reviewed annually by a local attorney who is familiar with the laws of your State.

Appendix A

Letter of Understanding

ABC Balloons

<Insert Date>

<Insert name and address of Organizer>

Dear <Insert name>:

I am looking forward to the opportunity to serve as Balloonmeister for the <insert year and name of event> scheduled for <insert event dates> in <insert city and state>. My role is to serve as the Balloonmeister. You and local staff and volunteers are responsible for the local organization and legwork necessary for this event. My responsibilities as well as the major responsibilities of the Organizer are outlined in an attachment, but I assure you I will make myself available as needed to ensure the success of your event. I will oversee all the technical aspects of hosting a safe, sanctioned, weekend hot air balloon event. If you have any questions, please call or e-mail me.

It is important to note that ballooning is a fair-weather sport and all flight related activities are extremely weather dependent. When soliciting sponsorship for the event, please ensure that sponsors are made aware of the reality of the situation. Flights, or even the entire event, may be cancelled due to unpredictable inclement weather conditions. All flight related decisions are based upon the safety of pilots, sponsors, and the public and rest solely with the Balloonmeister and his officiating staff including the Safety and Weather Officer. See additional comments on weather on the attached list of responsibilities.

My fee for the services outlined in the attached documents is <insert fee and payment schedule, if applicable>. A hotel room will be needed for <insert names or details of staff needing rooms> who assist us with technical aspects of the event throughout the weekend with arrival <insert arrival and departure date>.

If you are in agreement with the terms and conditions of this arrangement, please sign the acknowledgement copy of this contract and return at your earliest convenience.

Sincerely,

Balloonmeister

ACCEPTED CONTRACT

By: _____
Signature

Date: _____

Print Name: _____

Title: _____

Responsibilities of Organizer <insert detailed list of responsibilities based on event specifics>

1. Work with the Balloonmeister to determine the type of balloon event that best suits the goals and objectives of the Organizer
2. Prepare a detailed time line of all organizational and logistical details leading up to and including the event. Time line will be reviewed and edited as needed by Balloonmeister for all technical balloon matters.
3. Prepare all registration information, develop and maintain mailing lists of pilots. All pilot correspondence will be developed in concert with the Balloonmeister. Pilot registration list to be reviewed and approved by Balloonmeister before acceptance letters are mailed.
4. Mail registration package to pilots.
5. Develop schedule of events with a detailed timetable starting with the first flight activity through the last flight.
6. Working in concert with the Balloonmeister, prepare a Pilot Operations Manual containing all pertinent weekend information for participants.
7. Make all logistical arrangements for launch field and launch field security and control.
8. Contact the local balloon Club, **<insert name of balloon club>** to develop a working relationship for much needed local support.
9. Set up a landowner relations committee and work with area balloonists to create a Prohibited Zone (PZ) map of the area depicting red and yellow zones. The local balloon club will be helpful in this matter.
10. Correspond with local school districts, park commissions, etc. to seek blanket permission for launches and landings during the balloon event.
11. Establish a group of volunteers to head up volunteer crew for out of town pilots needing local crew.
12. Establish a list of potential targets within a 360-degree radius extending 2 to 5 miles from the primary launch/target site. Each target must list the UTM grid reference, degrees from primary launch site, and a description of the area and directions to locate the target site. Balloonmeister will provide Organizer names of local pilots able to work with Organizer to accomplish this task.
13. Acquire 6-8 volunteers to serve as measuring officials. These will be assigned to remote target teams of three to four each. They will need a driver and must be familiar with the area and be trained in GPS usage and target layout and measurement techniques. Each remote target team will also need a cellular phone.
14. Acquire a minimum of two and preferably three official size targets for use in competition. I can provide information on suppliers if needed.
15. Contract with **<insert suggested map maker's name>** or other suitable supplier for creation and production of competition maps (cost is about \$7 each). Order about 10 more than registered pilots.
16. Acquire a supply of competition baggies with enough for each participating pilot plus additional for replacements. You should have three separate sets of different colors.
17. Acquire other miscellaneous scoring supplies as follows:
 - a. Three (3) 100 meter (330') measuring tapes
 - b. One hundred survey marking flags
 - c. Air horn
 - d. Set of flags for the flag station in accordance with BFA rules. Flag pole for use at primary launch site.
 - e. Large helium tank and bag of 16" balloons for use with Theodolite (measures wind direction and speed at various altitudes).
18. Make arrangements for propane refueling allowing for ability to refuel a minimum of six balloons simultaneously.
19. Develop communications plan to coordinate airspace during balloon operations with **<insert name of any local airport>** working with the local (FAA) and Balloonmeister.
20. It is suggested that the Organizer contact all local fire, EMS, and safety forces and offer training in emergency balloon preparedness (first responders). The local area balloon club would be an excellent resource should you decide to pursue this.
21. Prepare and send pilot acceptance package to approved pilots.
22. Make all housing and hospitality arrangements for participating pilots and crew.
23. Set up and run on site registration and pilot document examination. Your local FAA may want to participate with you in the document examination

24. Obtain a suitable and approved Weather Officer for the event.
25. Provide a suitable Officials' Room as well as pilot briefing area. The Officials Room should have access to an outside phone line, Internet access (high speed preferred), copy machine, and coffee. The Pilot Briefing room should comfortably accommodate 2 ½ times the number of registered pilots.

Responsibilities of Balloonmeister <insert detailed list of responsibilities based on event specifics>

1. The Balloonmeister is responsible for all flight related operations for the event with safety for the participating pilots and the public the top priority.
2. Work with and advise the Organizer in the best event format to attract skilled pilots and meet the Organizer's mission.
3. Work with the Organizer to develop pilot correspondence to explain the nature and complexity of the event through the pilot recruitment process.
4. Coordinate preparation of official competition map with local Organizer and map maker.
5. Work with local pilots and develop appropriate target sites other than primary launch field. Prepare final target map and workbook.
6. Review list of pilot applications and have final approval of all applicants before acceptance correspondence is mailed.
7. Organize and supervise on-site registration document exam.
8. Organize and run master pilot briefing on Friday evening as well as task briefings.
9. Supply the following experienced personnel:
 - a. Staff Coordinator/Scoring
 - b. Safety Officer
 - c. Other technical support as needed depending on size and nature of event
10. Develop plan of tasks testing pilot skills and accommodating needs of Organizer
11. Prepare the FAA Waiver for submission to the local FSDO.
12. File the NOTAM as required by the FAA Waiver 48-72 hours prior to the first scheduled flight
13. Work closely with Weather and Safety Officer concerning go/no-go decisions.
14. Work with local FSDO to ensure a safe event for pilots and participating crowds.
15. Provide technical assistance to Organizer as needed and requested.

Weather Considerations for Event Planning

Weather is a major factor in the success of a balloon event and, of course, no one can predict the weather. We establish minimum weather criteria needed to conduct balloon flights in our FAA Waiver and these minimums are firm, non-negotiable conditions. Poor weather shall not be grounds for non-payment of prize money to participating balloon pilots (subject to rules set forth in the Pilot Manual) nor shall other benefits be withheld due to cancelled flights.

In the event the Balloonmeister determines that the minimal flight weather exists and allows for flights to take place, the participating balloon pilots are not required to fly. The decision to fly the balloon, or not fly, is the sole decision of the pilot-in-command. The Balloonmeister, nor any other individual or entity, has the authority to mandate the pilot and balloon take flight.

In the event the balloon takes flight, the pilot-in-command has the sole discretion to take a passenger, the number of passengers, and which passengers he is capable of carrying on any particular flight.

Appendix B

Pro Forma Budget

Based on a 50-balloon event

Budget Category	Details	Event Budget
Revenue Source:		
Local sponsors - cash & in-kind	Cash: combination of major title sponsors and individual balloons at \$500 - \$1000 ea. In-kind: examples might include propane, hotel rooms, breakfast refreshments, primary launch field facilities, program and other printing, map creation and printing	\$46,000
Pilot Entry Fees (show up)	50 pilots @ \$75 - \$100 each – generally refunded at on-site registration or included in prize money distribution	\$5,000
Total Revenue		<u>\$51,000</u>
Expenses:		
Operating Expenses	Shirts, pins, entertainment, generators, tents, port-a-johns, security, Basket sponsor banners, helium, recall system	\$8,000
General & Admin. Expenses	Insurance, phone stationary, media, advertising, art & logo design, program printing	\$6,000
Hospitality	Awards brunch, welcome party, breakfast coffee/rolls, etc.	\$6,000
Travel & Stipends for Staff	Auto mileage, air fares and stipends	\$2,000
Event supplies & award	Supplies, targets, markers, etc.	\$1,000
Pilot Prize Fund	This can vary significantly but on average would be \$2,000 - \$10,000	\$10,000
Propane	4 flights using 2700 gal (4 X 18-gal X 50 pilots X 75%) @ \$2	\$5,400
Maps	Design and production of topographical-type maps	\$700
Pilot Lodging	50 pilots X 2 nights X \$100	\$10,000
Staff Lodging	3-5 staff rooms X 3 nights X \$100 (might be able to fill with locals)	\$1,500
Pre-Event Staff Lodging	1 staff X 2 visits X 2 nights X \$100	\$400
Total Expenses		<u>\$51,000</u>

Budget based on officials staff of 4 + local volunteers		People
Balloonmeister		1
Weather Officer		1
Safety Officer		1
Scoring	Generally, only needed if a competitive event	1
Target/scoring support	Varies greatly depending on nature of event	6-12
		10-16

Appendix C

Sponsor Contract

Sponsor: <enter sponsor name>
Event: Best City Balloon Event
Date: <enter event dates>
Location: <enter venue address>

Your support of the <Best City Balloon Event> is very much appreciated. We have listed the benefits of your sponsorship below and hope you enjoy your involvement with our event. It is important to point out that the <Best City Balloon Event> is an outdoor event relying on fair weather conditions. Clearly, ballooning is a fair-weather sport. All decisions concerning flight activities are evaluated by our experienced officials including the Balloonmeister, Weather and Safety Officer. In addition, Federal Aviation Regulations place the final responsibility and decision to launch with each individual pilot-in-command. While we hope you are able to enjoy the ride as part of your sponsorship package, we want you to understand that the ride element of the package is dependent upon weather conditions which are beyond our control.

Your support of the <Best City Balloon Event> in the amount of <enter \$ amount> entitles you to the following benefits and promotional opportunities:

- One (1) sport balloon with one (1) ride during the Friday evening sponsor flight only (weather permitting). If weather prohibits a flight on Friday night, no ride will be given and <insert refund, if any> will be refunded to the sponsor at the conclusion of the <Best City Balloon Event>.
- Eight (8) tickets to the Friday and Saturday night Hospitality tent (four each night). The tent includes food and beverage as well as an excellent view of the launch field.
- Recognition in 10,000 event programs
- One (1) VIP parking pass (good for both Friday and Saturday)
- Promotion via the PA system throughout the weekend
- Two (2) 36" by 36" banners with your company name, displayed on the balloon basket throughout the weekend

ACCEPTED ON BEHALF OF: _____
(Company name as you want it to appear in print)

Signature: _____

Printed Name: _____

Title: _____

Address: _____

Phone: _____ **E-mail address:** _____

Please select one of the following payment options:

Payment enclosed

Invoice

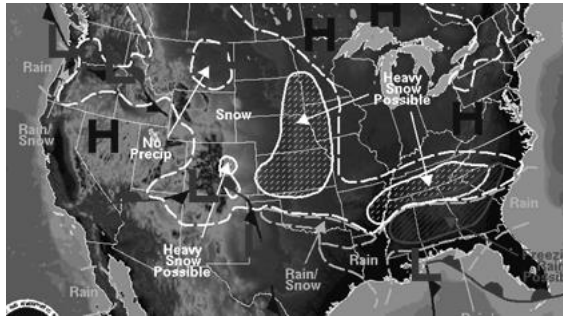
Thank you for your support!

Mail or fax the completed contract to:
<enter name, address, phone number, etc.>

Appendix D

Weather Briefing Sheet Template Example

August 23, 2017-PM



Example Surface Chart

(does not match weather data provided in example)

Synopsis: An elongated area of high pressure extends from Quebec down into the northern Great Lakes. Clockwise flow around the high will yield northeast flow across the region this evening. The deck of clouds that has plagued the area much of the day should gradually begin to fall apart towards sunset. A low pressure system over western Manitoba will shift east causing the synoptic flow to turn easterly. The easterly winds will draw low level moisture. This combined with the lingering low-level moisture may cause fog/low clouds to develop in the morning.

Valid TAF:

TAF KBTL 231740Z 2318/2418 03007KT P6SM BKN030
 FM232300 03005KT P6SM SKC
 FM240800 12004KT 3SM BR SCT012
 FM241000 14003KT 2SM BR BKN005
 FM241400 15005KT 4SM BR BKN015
 FM241500 18008KT P6SM SCT030

TAF KAZO 231740Z 2318/2418 03007KT P6SM BKN030
 FM232300 03005KT P6SM SKC
 FM240800 12004KT 3SM BR SCT012
 FM241000 14003KT 2SM BR BKN005
 FM241400 15005KT 4SM BR BKN015
 FM241500 18008KT P6SM SCT030

Surface Observations:

KBTL 231953Z 04007KT 10SM OVC036 23/17 A3010 RMK AO2 SLP188 T02330172
 KRMV 232015Z AUTO 02003KT 10SM BKN026 OVC038 23/18 A3008 RMK AO2
 KAZO 231953Z VRB06KT 10SM OVC038 24/16 A3009 RMK AO2 SLP185 T02440161
 KJXN 231956Z 36005KT 10SM OVC039 23/17 A3008 RMK AO2 SLP184 T02330172
 KLAN 231953Z 05011KT 10SM SCT026 OVC035 23/17 A3010 RMK AO2 SLP190 T02330172

Forecast Wind Information (heights in AGL)

RAP Forecast Model 6 pm

alt	mb	t/td	dir/w_spd
(ft)	(°F)	(kts)	
SFC	984	74/65	58°/006
100	981	74/65	58°/008
200	976	74/64	60°/010
400	969	73/63	60°/012
700	959	72/62	61°/013
1000	950	71/61	61°/014
1300	940	69/60	61°/014
1600	930	67/60	61°/014
1800	925	66/60	61°/014
1900	921	66/60	61°/014
2200	911	64/59	61°/014
2500	901	62/58	60°/015
2800	892	61/58	60°/015
3100	882	59/57	60°/015
3400	873	58/56	60°/015
3700	863	56/56	60°/015
4000	853	55/54	60°/015

RAP Forecast Model 6 pm

alt	mb	t/td	dir/w_spd
(ft)	(°F)	(kts)	
4300	844	57/42	66°/015
4700	834	59/36	69°/016
5000	824	59/32	65°/016
5300	815	60/30	55°/017
5700	805	59/24	48°/018
6000	795	58/21	46°/018
6300	786	58/19	43°/019
6700	776	57/17	42°/020
7100	762	56/15	41°/022
8100	734	54/12	37°/023

Pibal Information 5:45 pm

Alt	Dir From	Spd (kts)
300	063	3
500	070	5
700	062	6
900	058	9
1100	061	9
1300	059	10
1500	062	10
1700	066	11
1900	066	12
2100	064	12
2300	069	8
2500	074	8
2700	077	9
2900	077	9
3100	081	9
3300	075	9
3500	080	8

FAR §91.103 requires the pilot to obtain all information pertinent to the flight including a weather briefing. All pilots are encouraged to get their own weather briefing in addition to this report.

Briefing Sheet Explanation and Guidance

Current Date:

Synopsis: This section should be a brief section (3-6 sentences) covering the synoptic conditions across the region. They may also cover various concerns throughout the flight period, such as low ceilings, visibility, and wind direction/speed changes with respect to both time and height. You may also include a very brief overview of what flight conditions are expected to be for the next scheduled flight. This should only be one to two sentences maximum. Information for this section may be gathered from current surface analysis, along with forecast discussions from local NWS weather forecast offices.

Valid TAF's: This section should include the latest TAF's for airports within the immediate area. This can be obtained by going to <http://weather.noaa.gov/weather/taf.shtml> and typing the four-letter airport identifier in the window and selecting submit.

Surface Observations: This section should include the latest METAR information (in coded form) from near-by and upstream airports. The upstream airports may vary based on the prevailing/expected wind direction.

Forecast Wind Information: This section should include forecast wind information through the flight time for the entire depth of the airspace allowed by the Waiver for an event. Heights are typically reported in AGL. If possible, include temperature and dew point information at the various levels, and also include observed wind information from a theodolite/PIBAL reading. Please provide as fine of resolution as possible, especially near the surface or in layers where conditions rapidly change. Pilots may prefer this section to report wind direction as TO instead of FROM. To obtain forecasted wind information, please contact the FAA via phone at 1-800-WX-BRIEF for a standard briefing and/or go to <http://rucsoundings.noaa.gov/> and select the model of choice, the forecast time frame and the airport identifier for the location of the event. If an airport identifier is not available, a "lat,lon" may be substituted.

Radar and Supplemental Information: To supplement pilot briefing sheets, images with the current surface analysis, satellite, wind profiler information, and radar information may be made available to the pilots. As these conditions are constantly changing, they can be made available electronically.

Appendix E

Standard Pilot Application Form

PILOT INFORMATION					
Name Last		First		Middle	
Street		Emergency Contact (<i>name and cell phone number</i>)			
City		State	Zip		
E-mail Address		BFA/HACD Competition Card # (<i>if applicable</i>)			
Home Phone		Pilot Cell Phone		Crew Chief Cell Phone	
Pilot Certificate No.	<input type="checkbox"/> Private <input type="checkbox"/> Commercial	PIC Hours	Hours Last 12 Months	Flight Rev Date	Currency Date
If you have been convicted of any offenses involving alcohol or drugs as outlined in 14 CFR §61.15 or §61.16 while holding a pilot certificate in the last five years, have you filed the Notification Letter required by §61.15? N/A Yes No Have you ever been cited by the FAA for violation of any FAR? <input type="checkbox"/> No <input type="checkbox"/> Yes, explain _____					
Male Pilot Jacket/Sweatshirt/Shirt Size: S M L XL 2X 3X Female Pilot Jacket/Sweatshirt/Shirt Size: S M L XL 2X 3X					
INSURANCE INFORMATION					
Carrier		Policy Number		Expiration Date	
Coverage per Passenger		Combined Single Limit		Policy Limits	
BALLOON INFORMATION					
Balloon Category	<input type="checkbox"/> Sport Balloon	<input type="checkbox"/> National Commercial Logo <input type="checkbox"/> Local Commercial Logo		<input type="checkbox"/> Special Shape	
N Number	Balloon Name	Registered Owner		Hours	
Date of Last 100-hour/Annual Inspection		Hours Since Last Inspection		Size	
Airworthiness Certificate <input type="checkbox"/> Standard <input type="checkbox"/> Experimental	Date Issued	Manufacturer	Model	Serial Number	
Balloon color, pattern or artwork description					

Note: This form contains the information necessary to register a pilot. Events, however, will need to design additional forms for required information specific to their event, i.e. glow or dawn patrol participation, hotel details and arrival dates, local crew needs, paid ride registration, pilot biographies, specific insurance authorizations, ramp check details, etc.

Appendix F

Pilot Entry Agreement

PILOT ENTRY AGREEMENT

Including Acknowledgement of Responsibility and Release of Liability

I hereby declare that I am participating in the **<name of event>** on **<insert date>** of my own free volition. I agree that the Organizers and sponsors of this event (including the **<name of event, Organizer, event venue>**, event race officials, your sponsor or any employees, officers, trustees, agents and/or members of the above mentioned entities) are providing me with the facilities and means for my participation in this event and in no way do they supersede the responsibility of the pilot in command, as shown in CFR § 91.3(a) and elsewhere in the Federal Aviation Regulations (FARs).

I hereby certify that I am aware of and agree with the responsibility legally transferred to me under the Federal Aviation Regulations (FARs) as regards my personal decision to fly my balloon, and any bodily injury or property damage resulting therefrom is solely my liability, and that my decision as pilot in command may affect my placement in this event if I choose not to fly. **I understand that the pilot of each balloon has full and complete authority over the balloon and is responsible for all decisions to be made associated with the balloon on the ground and in the air.**

I certify that I am of sound mind and body and I have no medical, mental, or physical limitations or conditions that would limit or impair my ability to safely fly my aircraft. I am not taking prescription or over the counter drugs/medications that may impair my ability to safely fly my aircraft.

Officials of the **<name of event>** may supply information, guidance, or data and will use reasonable care to ensure the information is accurate and complete. However, the **<name of event>** assumes no responsibility for the completeness or accuracy of such information. It is my decision whether to rely on that information or acquire additional information. I agree that none of the flights are mandatory and that I will make all flights at my option.

I hereby agree to have in full force during the **<name of event>** a balloon insurance policy with minimum liability limits of \$1,000,000 each occurrence combined bodily injury and property damage, including passengers, but not less than \$100,000 each passenger.

I hereby give permission, without any restriction, to **<name of event>** or its assigns, to use still and motion pictures and sound recordings of me, my balloon, equipment, chase crewmembers, employees and agents for news, advertising, promotional media and commercial uses.

It is my understanding that the Organizers may inspect all balloons entered in the event, but that such inspection is only for the purpose of determining whether the aircraft complies with all rules of eligibility of said event. The approval of the balloon by said officials does not constitute a representation or warranty of any kind or character whatsoever concerning the mechanical condition of the aircraft, or whether or not it is airworthy.

<optional list of additional requirements of the event such as sponsor ride commitments, ride sale details, use of GPS loggers, etc.>

I agree that this Agreement is a **<insert state>** contract and it is to be governed by the laws of the State of **<insert state>**, and that I hereby submit myself to the jurisdiction of the **<insert state>** courts concerning any claims arising out of the **<insert year and name of event>** or this Agreement. This Agreement, including the Conditions of Entry, General Information, Insurance and Hotel Reservation form, contains all the terms and conditions agreed to by the parties hereto, and no other agreements or discussions, oral or written, regarding the subject matter of the Agreement shall be deemed to exist or bind any of the parties hereto.

I, the pilot in command, hereby declare that I will fly in accordance with the event rules and regulations, abide by the FARs, and fly entirely at my own risk and waive any right of action against **<name of event>**, the owner of the launch site, event race officials, your sponsor or any employees, officers, trustees, agents, and their respective members for any loss or damage sustained by me in consequence of any action or omission on their part, my part or the part of other participants.

Thus, I release the Organizers and sponsors of this event (including the **<name of event>**, event race officials, my sponsor or any employees, officers, directors, trustees, employees, volunteers, agents and sponsors and/or members of the aforementioned entities) from liability for their actions or inactions relating to the **<name of event>** which may arise out of or result from or in any manner be connected with the balloon flight or activity in which I participate as a pilot in command.

BY MY SIGNATURE BELOW, I CERTIFY THAT ALL INFORMATION CONTAINED IN THE REGISTRATION IS ACCURATE AND I ACCEPT THE TERMS OF THIS ENTRY AGREEMENT.

Pilot Name (Please Print)

Signature

Date

Disclaimer: This form contains legal language relating to a release of liability. State laws vary. Consult with a local attorney who is familiar with the laws of your State.

Appendix G

Sample Propane Refueling Rules and Procedures

Refueling phone number: Jimmy Doe, 318-xxx-yyyy

If you are going to be delayed for any reason, you must contact Jimmy Doe so that he can make appropriate plans with the individuals working propane. Failure to contact Jimmy may result in your inability to get propane. We may well assume you did not fly and have no need for propane. Please help us ensure that you have propane for your next flight.

If for any reason you decide not fly a particular flight, please call the Safety Officer. Please proceed directly to propane after your flight and save the after-flight celebration for the hotel parking lot.

When refueling, please follow these guidelines:

1. Have your refueling adapters hooked up prior to entering the fueling area. After completing refueling, leave the area to complete the covering of your balloon and any other housekeeping that may be required.
2. No more than two from each balloon crew may be in the refueling station area. Persons involved in refueling must be experienced in refueling propane tanks.
3. Pilots are responsible for proper filling of tanks.
4. Disarm strikers and remove from basket.
5. Leave cell phones in the chase vehicle.
6. No nylon jackets in the refueling area.
7. Only tanks used in flight will be refueled.
8. Pilot lights in campers, chase commanders, etc., must be turned off.
9. All vehicles must be turned off.
10. No persons are permitted inside the balloon basket or vehicle passenger compartment during refueling.
11. No refueling of tanks in enclosed trailers or vans.
12. Absolutely no smoking in the area.

Emergency Procedures: In the event of a fire during refueling. It is recommended to leave your keys in your vehicle prior to refueling -- in the ignition or on the dash.

Fire is not involving your balloon system:

1. Stop all refueling operations.
2. Shut all valves, including liquid and vapor.
3. Leave your equipment connected.
4. Confirm with propane operator the "Emergency Shut Off" on propane vehicle is activated.
5. Leave the refueling area and report to check-in location.
6. Do Not attempt to remove your vehicle from the refueling area.
7. Stand by for further instruction from Public Safety Officials.

Fire involving your balloon systems:

1. Shut all valves, including liquid and vapor, if conditions will allow.
2. Notify propane operator of fire.
3. Confirm with propane operator the "Emergency Shut Off" on propane vehicle is activated.
4. Report all injuries to Public Safety Officials if not injuries are not noticeable.

Refueling Hours

<insert day and date>

<insert refueling hours>

<insert day and date>

<insert refueling hours>

***Local laws and ordinances vary from state to state and municipality to municipality.
Consult with local fire officials for assistance in drafting propane refueling rules and policies.***

Appendix H

Sample Incident and Accident Report *for Safety Officer*

SUMMARY OF INCIDENT or ACCIDENT				
Date		Time		
Location Address	Property Owner	City, State, Zip	GPS Coordinates	
Flight Phase: <input type="checkbox"/> Lay Out/Inflation <input type="checkbox"/> Take Off <input type="checkbox"/> Landing Approach <input type="checkbox"/> Landing-Other				
PILOT				
Name		Address	City, State, Zip	
Certificate No.		Issue Date	Validity Date	
Total Flight Time		Total PIC Time	PIC Time Last 12 months	
BALLOON				
Registration No.		Volume	AX Class	Total Flight Time
Airworthiness Certificate No.		Manufacture Date	Name of Balloon	
Manufacturer of Envelope			Type	
Burner			Type	
Basket			Type	
Propane Cylinder Manufacturer	Type/Size	Propane Cylinder Manufacturer	Type/Size	
Propane Cylinder manufacturer	Type/Size	Propane Cylinder manufacturer	Type/Size	
FLIGHT AND ACCIDENT/INCIDENT DETAILS				
Number of Persons in Basket: <input type="checkbox"/> ___ PIC <input type="checkbox"/> ___ P1 <input type="checkbox"/> ___ P2 <input type="checkbox"/> ___ P3				
Launch Time	Landing Time	Flight Time	Take-Off Weight	Fuel - Gallons
Maximum Altitude	Estimated Wind Speed: Take-Off ___ kts During Flight ___ kts Landing ___ kts			
Injuries <input type="checkbox"/> Pilot: <input type="checkbox"/> Passenger 1: <input type="checkbox"/> Passenger 2: <input type="checkbox"/> Others:				
Damage: <input type="checkbox"/> Envelope <input type="checkbox"/> Basket <input type="checkbox"/> Burner <input type="checkbox"/> Instruments <input type="checkbox"/> Other				
Description and Comment:				

Appendix I

Designated Flightcrew Acknowledgement Form

Designated Flightcrew Form

Please Print:

Pilot Name: _____
First Middle Last

ACKNOWLEDGEMENT OF RESPONSIBILITY AND BRIEFING

FAA ORDER 8900.1 states that: only Flightcrew members may be carried on board any balloon operating under the FAA Waiver issued to *<name of event>* for the period *<insert start and end dates of event>*.

I hereby acknowledge that:

- a) I have received appropriate training concerning my duties relative to the event;
- b) I have attended the pilot and crewmember briefing before each event;
- c) I have read the FAA Waiver and I have been briefed on its limitations; and,
- d) I have been designated Event Flightcrew member for the purpose of this event.

_____ PRINTED NAME	_____ SIGNATURE	_____ Date
_____ PRINTED NAME	_____ SIGNATURE	_____ Date
_____ PRINTED NAME	_____ SIGNATURE	_____ Date
_____ PRINTED NAME	_____ SIGNATURE	_____ Date
_____ PRINTED NAME	_____ SIGNATURE	_____ Date
_____ PRINTED NAME	_____ SIGNATURE	_____ Date

Events flying under an FAA Waiver of 14 C.F.R. §91.119(b) & (c) Minimum Safe Altitudes are required to have all event flightcrew members sign a statement that they have been briefed and that they are 'designated event Flightcrew members' for the purpose of the specific event for which the waiver is granted. See FSIMS 8900.1, CHG 86, 3-152 (G)

Appendix J

Assumption of Risk & Waiver of Liability Agreement

ASSUMPTION OF RISKS & WAIVER of LIABILITY AGREEMENT

I, _____,
Print First Name *Print Middle Name* *Print Last Name*

on behalf of myself, my heirs, successors, executors, administrators, and legal representatives (collectively "I") do hereby acknowledge that I have VOLUNTARILY applied to participate in hot air Ballooning Activities (defined below) and am voluntarily executing this Release of Liability and Assumption of Risk Agreement ("Agreement") in consideration for the ability to participate in hot air ballooning activities and use the hot air balloon equipment and all actions or activities incidental or related thereto, including but not limited to, the preparation, take-off, flight, landing, boarding, pack-up or travel to or from the take-off or landing areas, including ground transportation thereto (hereinafter collectively "Ballooning Activities"). I understand and acknowledge that **Ballooning Activities are a hazardous activity and involve inherent risks which combined with the forces of nature, acts of commission, or omission, by participants or others, could lead to injury or even death.** I also understand that the property upon which the takeoff or landing of the balloon is to occur may not be in a safe condition. I acknowledge that the hazards associated with Ballooning Activities include **but are not limited to** loss or damage to personal property, arrest for trespassing or other violations, injury or fatality due to capsizing of the basket, collision with obstacles on the ground or in the air, accident or illness in remote areas without medical facilities, falling getting in or out of the balloon basket or falling while aboard the balloon, in the air or on the ground, or temperature extremes and inclement weather.

I do hereby irrevocably assume all risk of injury, property damage, and/or death which may occur as a result of my participation in Ballooning Activities.

I acknowledge that per the Federal Aviation Regulations, the pilot of the aircraft is in full and complete charge and control of the balloon and is solely responsible for all decisions made concerning all things or persons in or connected with the balloon on the ground or in the air. I agree to follow all instructions of the pilot in connection with the Ballooning Activities. I understand that the failure to do so may jeopardize our safety and the safety of the pilot, other passengers, and other persons. I further understand that the pilot is not a medical professional and cannot assess my physical or emotional condition.

I do further **release, indemnify, hold harmless and covenant not to sue** <name of pilot, event, Organizer, venue>, their employees, balloon crew, sponsors, agents, representatives, contractors, subcontractors, sponsors, successors, heirs, assigns, executors, administrators, affiliates and legal representatives ["Released Parties"] from **all claims, rights, demands or actions** of every nature and kind whatsoever, known or unknown, discovered or undiscovered, accruing or yet to accrue, **including but not limited to, personal injury or property damage claims, negligence claims and/or wrongful death claims and any reasonable attorney's fees and court costs incurred in defending said claims**, which I, my spouse, heirs, any minor children of mine, my estate, representatives, executors, administrators, and assigns may have against the Released Parties in connection with, relating to or arising from the Ballooning Activities.

This Agreement shall be governed, enforced and interpreted under <enter state> law. Should any clauses in this Agreement be in conflict with state law, then only that clause shall be null and void while the remaining clauses shall remain in full legal force and effect.

I certify that I am eighteen (18) years of age or older and that I have no medical or mental condition that prevents me from participating in the Ballooning Activities or executing this Agreement, including but not limited to pregnancy or heart, back or altitude problems

This **RELEASE OF LIABILITY & ASSUMPTION OF RISK AGREEMENT** is the full, final, and entire agreement between the undersigned and the Released Parties regarding the matters herein addressed.

In the space below, please print the following:

"I have carefully read this Agreement and I fully understand it."

Please read & initial to indicate understanding:

Signature of Participant

"I have carefully read this Assumption of Risks and Waiver of Liability Agreement and I fully understand it"

Print Full Name

Date

DISCLAIMER: State laws vary. Some states do not permit Release Agreements that attempt to grant immunity for personal injuries caused by negligence. Nevertheless, a Release Agreement may still discourage claims and lawsuits. Consult with a local attorney who is familiar with the laws of your State.

ASSUMPTION OF RISKS & WAIVER of LIABILITY AGREEMENT

<For use with minors>

for myself and on behalf of my following minor children known as _____, and _____ (“Minors”) and for each of our heirs, assigns, successors, executors, administrators and legal representatives, (collectively “We”) do hereby acknowledge that We have VOLUNTARILY applied to participate in hot air Ballooning Activities (defined below) and We are voluntarily executing this Release of Liability and Assumption of Risk Agreement (“Agreement”) in consideration for our ability to participate in hot air ballooning activities and use the hot air balloon equipment and all actions or activities incidental or related thereto, including but not limited to, the preparation, take-off, flight, landing, boarding, pack-up or travel to or from the take-off or landing areas, including ground transportation thereto (hereinafter collectively “Ballooning Activities”). We understand and acknowledge that **Ballooning Activities are a hazardous activity and involve inherent risks which combined with the forces of nature, acts of commission, or omission, by participants or others, could lead to injury or even death.** We also understand that the property upon which the takeoff or landing of the balloon is to occur may not be in a safe condition. We acknowledge that the hazards associated Ballooning Activities include **but are not limited to** loss or damage to personal property, arrest for trespassing or other violations, injury or fatality due to capsizing of a basket, collision with obstacles on the ground or in the air, accident or illness in remote areas without medical facilities, falling getting in or out of the balloon basket or falling while aboard the balloon, in the air or on the ground, or temperature extremes and inclement weather.

We hereby irrevocably assume all risk of injury, property damage, and/or death which may occur as a result of our participation in Ballooning Activities.

We acknowledge that per the Federal Aviation Regulations, the pilot of the aircraft is in full and complete charge and control of the balloon and is solely responsible for all decisions made concerning all things or persons in or connected with the balloon on the ground or in the air. We agree to follow all instructions of the pilot in connection with the Ballooning Activities. We understand that the failure to do so may jeopardize our safety and the safety of the pilot, other passengers, and other persons. We further understand that the pilot is not a medical professional and cannot assess my or my Minor’s physical or emotional condition.

We do further **release, indemnify, hold harmless and covenant not to sue <name of pilot, event, Organizer, venue>**, their employees, balloon crew, sponsors, agents, representatives, contractors, subcontractors, sponsors, successors, heirs, assigns, executors, administrators, affiliates and legal representatives [“Released Parties”] from **all claims, rights, demands or actions** of every nature and kind whatsoever, known or unknown, discovered or undiscovered, accruing or yet to accrue, **including but not limited to, personal injury or property damage claims, negligence claims and/or wrongful death claims and any reasonable attorney’s fees and court costs incurred in defending said claims**, which We, our spouses, heirs, any minor children of ours, our estate, representatives, executors, administrators, and assigns may have against the Released Parties in connection with, relating to or arising from the Ballooning Activities.

This Agreement shall be governed, enforced and interpreted under **<enter state>** law. Should any clauses in this Agreement be in conflict with state law, then only that clause shall be null and void while the remaining clauses shall remain in full legal force and effect.

I certify that I am eighteen (18) years of age or older and that I am the legal guardian and/or parent of the Minors with authority to sign this document on the Minors’ behalf. I further certify that I and my Minors have no medical or mental condition which prevents us from participating in the Ballooning Activities or executing this Agreement, including but not limited to pregnancy or heart, back or altitude problems.

This **RELEASE OF LIABILITY & ASSUMPTION OF RISK AGREEMENT** is the full, final, and entire agreement between the undersigned and the Released Parties regarding the matters herein addressed.

In the space below, please print the following:

“I have carefully read this Agreement and I fully understand it.”

Signature (Adult)

Signature (Minor Child)

Print Full Name

Date

Print Full Name

Date

DISCLAIMER: State laws vary. Some states do not permit Release Agreements that attempt to grant immunity for personal injuries caused by negligence. Nevertheless, a Release Agreement may still discourage claims and lawsuits. Consult with a local attorney who is familiar with the laws of your State.

Appendix K

Passenger Briefing – Written Acknowledgement

HOT AIR BALLOON PRE-FLIGHT PASSENGER BRIEFING

1. According to Federal Aviation Regulations, the Pilot in Command (PIC) is responsible for all flight related decisions. Please adhere to any instructions he may provide.
2. **DO NOT SMOKE** in or near the aircraft. Propane is Explosive!
3. Stay clear of the inflator fan.
4. Do not enter the basket until the pilot invites you to do so.
5. Enter the basket carefully; you may use the uprights to help yourself in.
6. **DO NOT TOUCH** the fuel hoses, propane tanks or aircraft instruments.
7. **DO NOT TOUCH** the cables, deflation or turning vent lines or anything advised by the PIC.
8. On launch and landing face the direction instructed by your PIC.
9. Keep hands and arms inside the basket at all times.
10. Advise followers not to intervene or enter anyone's property in their vehicle or on foot without prior permission of the landowner.
11. Advise followers to stay clear of the chase vehicle during flight and landings.
12. **LANDINGS MAY INCLUDE HARD, FAST, ROUGH IMPACT WITH THE GROUND!** Read the *Preparation for Landings* Instructions below.
13. Read the Assumption of Risk & *Release of Liability* form carefully, and then please sign it, IF it is acceptable to you.

As a passenger or FAA Designated Flightcrew member, you may be invited to participate in “ground crew operations” (such as balloon inflation, deflation and pack-up); or “flightcrew tasks” (such as: reading the Global Positioning System [GPS] Instrument; reading gauges, communicating with the ground crew via radio, reading maps, watching for obstacles, etc.); and similar tasks. You may decline the invitation at your sole discretion. The purpose of the invitation is to permit you to have a “hands-on” experience if you choose.

PREPARATION FOR LANDING

1. Stow and secure all cameras and personal belongings in the bottom of the basket.
2. FACE THE DIRECTION OF TRAVEL.
3. Place your feet shoulder length apart with one foot in front of the other – karate style.
4. HOLD ON TIGHT to handles or other areas as directed by the PIC.
5. BEND YOUR KNEES to avoid the shock of impact with the ground – the faster the decent – the lower your center of gravity must be.
6. Keep your hands, arms, feet and legs inside the basket.
7. STAY IN THE BASKET.
8. DO NOT EXIT THE BASKET until you are given personal/ individual permission to exit by the pilot.

Today's Date: _____

I have heard, witnessed and understand _____ (pilot) explain in detail the above Pre-flight information, and have no questions.

I fully understand not only the above information, but the fact that Hot Air Ballooning is a 'participatory sport' that may result in injury or death.

_____ Passenger	_____ Crew
_____ Passenger	_____ Crew
_____ Passenger	_____ Crew

Appendix L

Application for Certificate of Waiver or Authorization

FAA Form 7711-2

No certificate may be issued unless a completed application form has been received (14 C.F.R. 91.101, and 105).

 <p>US Department of Transportation Federal Aviation Administration</p> <p>APPLICATION FOR CERTIFICATE OF WAIVER OR AUTHORIZATION</p>	Form Approved: O.M.B. No. 2120-0027 08/31/2008		
	APPLICANTS - DO NOT USE THESE SPACES		
	Region Great Lakes	Date JUL 28 2017	
	Action <input checked="" type="checkbox"/> Approved <input type="checkbox"/> Disapproved - Explain under "Remarks"		
Signature of authorized FAA representative 			
INSTRUCTIONS			
<p>Submit this application in triplicate (3) to any FAA Flight Standards district office.</p> <p>Applicants requesting a Certificate of Waiver or Authorization for an aviation event must complete all applicable items on this form and attach a properly marked 7.5 series Topographic Quadrangle Map(s), published by the U.S. Geological Survey (scale 1:24,000), of the proposed operating area. The map(s) must include scale depictions of the flightlines, showlines, race courses, and the location of the air event control point, Police dispatch, ambulance, and fire fighting equipment. The applicant may also wish to submit photographs and scale diagrams as supplemental material to assist in the FAA's evaluation of a particular site. Application for a Certificate of Waiver or Authorization must be submitted 45 days prior to the requested date of the event.</p> <p>Applicants requesting a Certificate of Waiver or Authorization for activities other than an aviation event will complete items 1 through 10 only and the certification, item 17, on the reverse.</p>			
1. Name of Organization Aviation Event Organizer: Midwest Airshow, Inc.		2. Name of responsible person Rudy Malnati	
3. Permanent mailing address	House number and street or route number 22 Madison Street, Suite 222	City Chicago	State and ZIP code Telephone No. Illinois 60603-3001 312-222-2223 312-222-2224
4. State whether the applicant or any of its principal officers/owners has an application for waiver pending at any other office of the FAA. N/A			
5. State whether the applicant or any of its principal officers/owners has ever had its application for waiver denied, or whether the FAA has ever withdrawn a waiver from the applicant or any of its principal officers/owners. N/A			
6. FAR section and number to be waived 14 CFR Section 105.21 Authorization for military parachute demonstrations (US ARMY GOLDEN KNIGHTS and USN LEAP FROGS).			
7. Detailed description of proposed operation (Attach supplement if needed) Sanctioned military parachute teams demonstrations. A TFR has been requested during the times the CoA is in effect in accordance with the provisions of 14 CFR §91.145			
8. Area of Operation (Location, altitudes, etc.) WITHIN FIVE (5) NAUTICAL MILES OF THE NORTH AVENUE BEACH SHOW CENTER, CHICAGO, ILLINOIS (ORD VOR/DME 106 DEGREE RADIAL, 13.6 NM FIX; N41°54'56" / W87°37'01") FROM THE SURFACE UP TO AND INCLUDING 16,000 FEET MSL. SEE ATTACHMENT "A."			
9a. Beginning (Date and hour) August 17, 2017:		b. Ending (Date and hour) August 20, 2017; (SEE ATTACHMENT "B")	
10. Aircraft make and model	Pilot's Name (b)	Certificate number and rating (c)	Home address (Street, City, State) (d)
SEE ATTACHMENT "C"			

FAA Form 7711-2 (8-08) Supersedes Previous Edition

ITEMS 11 THROUGH 16 TO BE FILLED OUT FOR AIR SHOW/AIR RACE WAIVER REQUESTS ONLY.

11. The air event will be sponsored by:
THE CITY OF CHICAGO – MAYOR’S OFFICE OF SPECIAL EVENTS

12. Permanent mailing address	House number and street or route number c/o: 22 Madison Street, Suite 23	City Chicago	State and ZIP code Illinois 60603-3001	Telephone No. 312-222-2223 312-222-2222
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13. Policing (Describe provisions to be made for policing the event.)
BARRICADES AND SECURITY GUARDS WILL PREVENT NON-PARTICIPANTS FROM ACCESSING THE OPERATIONAL AREAS. ADDITIONAL ASSISTANCE WILL BE PROVIDED BY U.S. COAST GUARD AND AUX, CHICAGO POLICE DEPARTMENT (AND MARINE UNIT), CHICAGO PARK DISTRICT MARINE UNIT, AND CONSERVATION DEPT. MARINE UNIT.
 See attachment D: "Security/Emergency Response Plans"

14. Emergency Facilities (Mark all that will be available at the time and place of the air event.)


Physician Fire Truck Other - Specify
 Ambulance Crash Wagon CPD MARINE UNIT
 See attachment D; "Emergency Response Plan"

15. Air Traffic Control (Describe method of controlling traffic, including provision for arrival and departure of scheduled aircraft.)
ESTABLISHED CONTROL POINT (PLATFORM CONTROL AT SHOW CENTER SITE) WILL BE IN DIRECT RADIO CONTACT WITH PERFORMING AIRCRAFT. DIRECT TELEPHONE AND RADIO CONTACT WITH TRACON, O'HARE ATCT, AND GARY/CHICAGO ATCT. ALL COORDINATION PERFORMED BY ON-SITE FAA AIR TRAFFIC CONTROL PERSONNEL FROM THESE FACILITIES.

16. Schedule of Events (Include arrival and departure of scheduled aircraft and other periods the airport may be open.)

Hour CDT (a)	Date (b)	Event (c)
0900-1500	08/17/2017	SEE ATTACHMENTS "B" FOR DETAILED PROPOSED SCHEDULE OF EVENTS. ACTUAL PERFORMANCE SCHEDULE WILL BE AVAILABLE AT ALL MANDATORY PRE-SHOW BRIEFINGS PRIOR TO THE PERFORMANCES.
0900-1600	08/18/2017	
0900-1600	08/19 & 20/2017	

If sufficient space is not available, the entire schedule of events may be submitted on separate sheets, in the order and manner indicated above.

Please Read  The undersigned applicant accepts full responsibility for the strict observance of the terms of the certificate of waiver or Authorization, and understands that the authorization contained in such certificate will be strictly limited to the above described operation.

15. Certification - I CERTIFY that the foregoing statements are true.

Date May 17, 2017	Signature of Applicant 
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Remarks

Glossary

Advisory Circular (AC). An FAA publication that informs the aviation public, in a systematic way, of non-regulatory material.

Accident. An occurrence associated with the operation of an aircraft which takes place between the time any person boards the aircraft with the intention of flight and all such persons have disembarked, and in which any person suffers death or serious injury, or in which the aircraft receives substantial damage. [National Transportation Safety Board (NTSB) 830.2]

Aeronautical Information Manual (AIM). A reference publication for pilots.

Airspace. Areas and altitudes defined by use, airport proximity, and air traffic control.

Annual Inspection. A maintenance term directed by CFR 14, part 91, section 91.409, which states that “no person may operate an aircraft unless, within the preceding twelve calendar months, it has had – (a) an annual inspection . . . and has been approved for return to service . . .”

ATC. Air Traffic Control

Automated Flight Service Station (AFSS). An air traffic facility that provides pilot briefings and numerous other services.

Automated Terminal Information Service (ATIS). The continuous broadcast (by radio or telephone) of recorded non-control, essential but routine, information in selected terminal areas.

Automated Weather Observing System (AWOS). Continuous broadcast (by radio or telephone) of weather conditions at selected locations.

Balloon Federation of America (BFA). A national association for balloon pilots and enthusiasts in the United States affiliated with the National Aeronautic Association.

Balloon Flight Manual. A manual containing operating instructions, limitations, weight and performance information, which must be available in an aircraft during flight. Portions of the flight manual are FAA approved.

Balloonmeister. A German term we have adopted to designate the person who is responsible for all safety and decisions on ground-based balloon activities at a balloon festival or competition. Also referred to as *Balloonmeister, Flight Director, Director of Operations and Flight Line Director.*

Ceiling. Altitude above ground level of the lowest level of scattered or overcast layer of clouds or vertical visibility into an obscuration.

CFR. Code of Federal Regulations.

Clinometer. The clinometer is an optical device for measuring elevation angles above horizontal. The most common instruments of this type currently used are compass-clinometers from Suunto or Silva. Compass clinometers are fundamentally just magnetic compasses held with their plane vertical so that a plummet or its equivalent can point to the elevation of the sight line.

Controlled Airspace. Airspace designated as Class A, B, C, D, or E within which air traffic control service is provided to some or all aircraft.

Convective Available Potential Energy (CAPE). A measure of the amount of energy available for convection. CAPE is directly related to the maximum potential vertical speed within an updraft; thus, higher values indicate greater potential for severe weather. Observed values in thunderstorm environments often may exceed 1000 joules per kilogram (J/kg), and in extreme cases may exceed 5000 J/kg.

Convective Inhibition (CIN). A measure of the amount of energy needed in order to initiate convection. Values of CIN typically reflect the strength of the cap. They are obtained on a sounding by computing the area enclosed between the environmental temperature profile and the path of a rising air parcel, over the layer within which the latter is cooler than the former. (This area sometimes is called negative area.)

Currency. Common usage for recent flight experience. In order to carry passengers, a pilot must have performed three take-offs and three landings within the preceding ninety days.

Density Altitude. Pressure altitude corrected for nonstandard temperature. Or, as explained in the Aeronautical Information manual (AIM), “a way to comparatively measure aircraft performance. See paragraph 7-5-6 of the AIM for a complete discussion.

FAA Waiver. An application to the FAA (nearest FSDO) requesting permission to allow changes (waives the rules for certain parts of the FARs) in the FARs so Balloon competition can be conducted in a reasonable manner. When granted, an FAA monitor(s) oversees the event to make sure the balloon event is in compliance with the terms of the Waiver.

Federal Aviation Administration (FAA). The Federal agency, a branch of the U.S. Department of Transportation, responsible to promote aviation safety through regulation and education.

Federal Aviation Regulations (FARs). Aeronautics and Space Code of Federal Regulations (CFR) contained in Title 14. Federal laws that regulate civilian aircraft and flight operations.

Flight Service Stations (FSS). Primary source of weather briefings and other flight-related information for pilots prior to each flight via privately contracted weather briefers and automated briefings.

Flight Standards District Office (FSDO). Field offices of the FAA, which deal with certification and operation of aircraft.

Flight Visibility. According to CFR 14, the average forward horizontal distance, of an aircraft in flight, at which prominent unlighted objects may be seen and identified by day and prominent lighted objects may be seen and identified by night.

FSIMS - Flight Standards Information System. Official guidance published to govern the Application for Waiver process as well as monitoring air races.

Hot Air Competition Division (HACD). A segment of the BFA membership who shares a common interest in competitive ballooning comprised of pilots, crew and event officials working to promote the advancement of competition within the BFA. The HACD also organizes, staffs and hosts the US National Hot Air Balloon Championship under sanction from the National Aeronautic Association, while also organizing local, state and regional competitions as qualifying events for the Nationals.

IFR (Instrument Flight Rules) Conditions. Weather conditions (ceiling, visibility, precipitation) below VFR (Visual Flight Rules) minimums that require instruments beyond those on board balloons for safe and legal flight. The FAA does not allow balloon flights under IFR conditions.

Incident. An occurrence other than an accident, associated with the operation of an aircraft, which affects or could affect the safety of operations.

Knot. A measure of wind speed equal to 1.15 miles per hour. Example: 8 knots X 1.15mph = 9.2mph.

Launch Director. Event official who determines and controls the order and timing of balloons launching from a common launch area at a balloon event.

Marker. Also known as “Baggie” are small “bean bags” with a nylon “tail”, dropped from balloons at various heights on a predetermined target(s) to score balloon competition. Standard marker weight is 77 grams (about 2 ½ ounces) and length is 170 cm (about 67 inches).

METAR. In weather reporting, an acronym for Aviation Routine Weather Report, which is an observation of current surface conditions reported in the standard international format. Routine METAR's are transmitted hourly; there is a special report (as indicated by the acronym 'SPECT') that may be issued at any time for rapidly changing weather conditions.

Notice to Airmen (NOTAM). A notice containing information concerning facilities, services, or procedures, the timely knowledge of which is essential to personnel concerned with flight operations.

Orthographic. A term pertaining to mountains or anything caused by mountains, as in orographic wind (wind formed by mountains) and orographic cloud (a cloud whose existence is caused by disturbed flow of air over and around a mountain barrier).

PZ (Prohibited Zone). Any restricted operating area where the landowner prohibits launch or landing. Some PZs (red) also carry minimum altitude restrictions.

PIBAL. Short for 'pilot balloon,' a small pre-flight helium-filled balloon released to assess wind direction, speed and stability as well as ceiling height.

PIC (Pilot in Command). The pilot is always responsible for safely operating the balloon during flight.

Pilot Report (PIREP). A report of in-flight weather by an aircraft pilot or crewmember. A complete coded report includes the following information in this order: location and/or extent of reported weather phenomenon: type of aircraft (only with reports turbulence or icing).

Ramp Check. FAA personnel can inspect/check a pilot and his aircraft to see that it complies with the FARs for safe continuation of his aviation activities.

Rapid Refresh Model (RAP). The RAP is a NOAA/ NCEP short range operational weather prediction system running every hour comprised primarily of a numerical forecast model and an analysis/assimilation system to initialize that model.

TAF (Terminal Aerodrome Forecast). TAF's are valid for a 24-hour time period and are updated four times daily. The TAF reporting system uses the same abbreviations as used in METAR reports.

Thermal. A column of rising air associated with adjacent areas of differing temperature. Thermal activity caused by the sun's heating usually starts two to three hours after sunrise.

Tether. Operation of a manned balloon generally below 100 feet while secured to the ground by a series of lines.

Theodolite. An instrument used in surveying to measure horizontal and vertical angles with a small telescope that can move in the horizontal and vertical planes. It is used to track the movements of either a pibal balloon or a radiosonde. The device uses mathematical formulas and triangulation to provide wind speed and direction in various increments, generally every 200 feet.

UTM (Universal Transverse Mercator). Geographic coordinate system that is a grid-based method of specifying locations on the surface of the Earth. It is used to identify locations on the earth independently of vertical position, but differs from the traditional method of latitude and longitude in several respects. The UTM system is not a single map projection. The system instead employs a series of sixty zones, each of which is based on a specifically defined secant transverse Mercator projection.

VAD Winds (Velocity/ Azimuth/ Display). In weather, VAD Winds are derived from the output of the 160 or more WRS-88 radar sites located throughout the United States. The WRS-88 is configured to produce radar returns off of dust and other particulate matter in the air, and in turn, those returns can be used to indicate wind speed and direction at different altitudes (generally reported in 1,000-foot increments).

VFR (Visual Flight Rules). Flight rules governing aircraft flight when the pilot has visual reference to the ground at all times.

Winds Aloft. Wind speed and direction forecast at various altitudes given at 3,000-foot intervals (3,000, 6,000, and 9,000).

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